

UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF MICHIGAN
SOUTHERN DIVISION

**IN RE NEO WIRELESS, LLC
PATENT LITIGATION**

2:22-MD-03034-TGB

HON. TERRENCE G. BERG

**OPINION AND ORDER
CONSTRUING DISPUTED
CLAIM TERMS (ECF NOS. 127,
131, 133, 150, 151, 154, 155)**

**THIS MEMORANDUM
OPINION AND ORDER
RELATES TO ALL CASES**

MEMORANDUM OPINION AND ORDER

The individual cases involved in this MDL matter are for patent infringement brought by Plaintiff Neo Wireless, LLC (“Neo” or “Plaintiff”) against Defendants Ford Motor Company, American Honda Motor Co., Inc., Honda Development & Manufacturing of America, LLC, Volkswagen Group of America, Inc., Volkswagen Group Of America Chattanooga Operations, LLC, Nissan North America, Inc., Nissan Motor Acceptance Corporation a/k/a Nissan Motor Acceptance Company, LLC, Toyota Motor Corporation, Toyota Motor North America, Inc., Toyota Motor Sales, U.S.A., Inc., Toyota Motor Engineering & Manufacturing North America,

Inc., Toyota Motor Credit Corporation, General Motors Company, General Motors, LLC, Tesla, Inc., Mercedes-Benz USA, LLC, and FCA US, LLC (collectively “Defendants”). In all nine cases, Neo alleges Defendants infringe six asserted patents related to LTE functionality. “LTE”, which stands for “Long Term Evolution” refers to a technical standard for wireless data transmission.

On June 21, 2023, the Court held a hearing to determine the proper construction of the disputed claim terms in U.S. Pat. No. 8,467,366 (the “366 Patent”); U.S. Pat. No. 10,833,908 (the “908 Patent”); U.S. Pat. No. 10,447,450 (the “450 Patent”); U.S. Pat. No. 10,075,941 (the “941 Patent”; U.S. Pat. No. 10,771,302 (the “302 Patent”); and U.S. Pat. No. 10,965,512 (the “512 Patent”) (collectively “Asserted Patents”). The parties have submitted written briefs explaining their positions on how the disputed claim terms should be construed. ECF Nos. 127, 131, 133, 150, 151, 154, 155.¹

Having reviewed the arguments made by the parties at the hearing and in their claim construction briefing, having considered the intrinsic evidence, and having made subsidiary factual findings about the extrinsic

¹ Citations to the parties’ filings are to the filing’s number in the docket (ECF No.) and pin cites are to the PageID numbers assigned by the Court’s electronic filing system.

evidence, the Court construes the disputed claim terms identified by the parties, pursuant to the procedure set forth in *Markman v. Westview Instruments, Inc.*, 517 U.S. 370 (1996). *See also Phillips v. AWH Corp.*, 415 F.3d 1303, 1314 (Fed. Cir. 2005) (en banc); *see also Teva Pharm. USA, Inc. v. Sandoz, Inc.*, 574 U.S. 318, 331 (2015).

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I. BACKGROUND

Plaintiff alleges that Defendants infringe the '366 Patent, the '908 Patent, the '450 Patent, the '941 Patent, the '302 Patent, and the '512 Patent. Shortly before the start of the June 21, 2023 Hearing, the Court provided the parties with preliminary constructions with the aim of focusing the parties' arguments and facilitating discussion.

The '366 Patent is titled "Methods And Apparatus For Random Access In Multi-carrier Communication Systems," was filed on August 8, 2011, and issued on June 18, 2013. The '366 Patent relates to "methods and apparatus for random access in a multi-carrier system." '366 Patent at 2:40–41. In particular, "ranging signals are designed to improve receiving reliability and to reduce interference with other uplink signals," and "improve the detection performance at the base station receiver." *Id.* at 2:41–46.

The Abstract of the '366 Patent states:

Methods and apparatus in a multi-carrier cellular wireless network with random access improve receiving reliability and reduce interference of uplink signals of a random access, while improving the detection performance of a base station receiver by employing specifically configured ranging signals.

Claim 1 of the '366 Patent is an illustrative claim and recites the

following elements (disputed or identified terms in italics):

1. In a multi-cell orthogonal frequency division multiple access (OFDMA) wireless communication system comprising a plurality of base stations and mobile stations, a mobile station configured to communicate with a serving base station in a cell via a communication channel, the mobile station comprising:

an apparatus configured to transmit a data signal to the serving base station in the cell over a data subchannel, wherein the data subchannel comprises a plurality of adjacent or non-adjacent subcarriers within the communication channel; and

an apparatus configured to transmit a ranging signal to the serving base station in the cell over a ranging subchannel for random access, wherein:

the ranging signal is formed from *a ranging sequence selected from a set of ranging sequences* associated with the cell for identifying the mobile station;

the ranging signal lasts over a period of one or multiple orthogonal frequency division multiplexing (OFDM) symbols and *the ranging signal exhibits a low peak-to-average power ratio in the time domain*; and the ranging subchannel comprises at least one block of subcarriers within the communication channel and power levels of subcarriers at both ends of a block are set to zero.

The '941 Patent is titled "Methods And Apparatus For Multi-carrier Communication Systems With Adaptive Transmission And Feedback," was filed on March 28, 2016, and issued on September 11, 2018. The '941

Patent relates to methods and apparatus for “adaptive transmission of wireless communication signals are described, where MCS (modulation and coding scheme), coding rates, training pilot patterns, TPC (transmission power control) levels, and subchannel configurations are jointly adjusted to adapt to the channel conditions.” ’941 Patent at 2:33–38. The specification states this “[t]his adaptation maximizes the overall system capacity and spectral efficiency without wasting radio resources or compromising error probability performance.” *Id.* at 2:38–41.

The Abstract of the ’941 Patent states:

An arrangement is disclosed where in a multi-carrier communication system, the modulation scheme, coding attributes, training pilots, and signal power may be adjusted to adapt to channel conditions in order to maximize the overall system capacity and spectral efficiency without wasting radio resources or compromising error probability performance, etc.

Claim 8 of the ’941 Patent is an illustrative claim and recites the following elements (disputed or identified terms in italics):

8. A link adaptation method by a mobile station served by a serving base station in an Orthogonal Frequency Division Multiplexing (OFDM) communication system, the communication system utilizing a transmission structure with time slots in the time domain and frequency subchannels in the frequency domain, the method comprising:

receiving a control message from the serving base station
over a control channel,
wherein:
the control message contains transmission parameters specific to the mobile station for a subsequent transmission by the serving base station over a frequency subchannel to the mobile station in a time slot; and
the mobile station-specific transmission parameters indicate an antenna transmission scheme and a corresponding subchannel configuration, the antenna transmission scheme comprising a transmission diversity scheme or a multiple-input multiple-output (MIMO) scheme and the corresponding subchannel configuration characterized by distributed subcarriers or localized subcarriers in the frequency domain;
and
receiving a data packet transmitted by the serving base station using the mobile station-specific transmission parameters over the frequency subchannel.

The '908 Patent and '302 Patent effectively share the same specification, and are titled "Channel Probing Signal for a Broadband Communication System." The '302 Patent was filed on April 16, 2018, and issued on September 8, 2020. The '908 Patent was filed on June 16, 2020, and issued on November 10, 2020. The '908 Patent and '302 Patent relate to a "broadband wireless communication system where both the Multi-Carrier (MC) and direct Sequence Spread Spectrum (DSSS) signals are

intentionally overlaid together in both time and frequency domains.” ’908 Patent at 2:42–45; ’302 Patent at 2:39–42. In particular, “[t]he system takes advantage of both MC and DSSS techniques to mitigate their weaknesses.” ’908 Patent at 2:45–47; ’302 Patent at 2:42–44.

The Abstract of the ’908 Patent and the ’302 Patent state:

In a broadband wireless communication system, a spread spectrum signal is intentionally overlapped with an OFDM signal, in a time domain, a frequency domain, or both. The OFDM signal, which inherently has a high spectral efficiency, is used for carrying broadband data or control information. The spread spectrum signal, which is designed to have a high spread gain for overcoming severe interference, is used for facilitating system functions such as initial random access, channel probing, or short messaging. Methods and techniques are devised to ensure that the mutual interference between the overlapped signals is minimized to have insignificant impact on either signal and that both signals are detectable with expected performance by a receiver.

Claim 23 of the ’302 Patent is an illustrative claim and recites the following elements (disputed or identified terms in italics):

23. A mobile device in an Orthogonal Frequency Division Multiplexing (OFDM) communication system, the mobile device comprising:
a receiver configured to receive a request for a probing signal from a base station in the system;
a transmitter configured to form and transmit, in response to the received request, the *probing*

signal with a code sequence modulated in the frequency domain, wherein:
the *probing signal* is configured to overlap, in the time domain, with uplink signals transmitted over an uplink frequency band by other mobile devices in the system; and
the *probing signal* is configured to occupy a portion of spectrum in the uplink frequency band not designated for transmission of uplink control signals in the system.

Claim 1 of the '908 Patent is an illustrative claim and recites the following elements (disputed or identified terms in italics):

1.A mobile station comprising:
a transmitter configured to:
transmit, to a base station, a first uplink signal within a frequency band, wherein the first uplink signal is an orthogonal frequency division multiplexing (OFDM) signal and utilizes a frame format comprising a plurality of timeslots, each timeslot comprising a plurality of OFDM symbols;
transmit, to the base station, a *random access signal* followed by a guard period in only a portion of the frequency band, wherein the *random access signal* includes a sequence associated with the base station, wherein a time duration of a combination of the *random access signal* and the guard period is greater than a time duration of at least one of the plurality of OFDM symbols; and
a receiver configured to receive, from the base station, a response message.

The '450 Patent is titled "Method And System For Multi-carrier

Packet Communication With Reduced Overhead,” was filed on August 14, 2017, and issued on October 15, 2019. The ’450 Patent generally relates “to wireless communication and, in particular, to multi-carrier packet communication networks.” ’450 Patent at 1:27–29. In particular, the specification discloses “[a] system and method for minimizing the control overhead in a multi-carrier wireless communication network that utilizes a time-frequency resource.” *Id.* at 2:45–47.

The Abstract of the ’450 Patent states:

A method and system for minimizing the control overhead in a multi-carrier wireless communication network that utilizes a time-frequency resource is disclosed. In some embodiments, one or more zones in the time-frequency resource are designated for particular applications, such as a zone dedicated for voice-over-IP (VoIP) applications. By grouping applications of a similar type together within a zone, a reduction in the number of bits necessary for mapping a packet stream to a portion of the time-frequency resource can be achieved. In some embodiments, modular coding schemes associated with the packet streams may be selected that further reduce the amount of necessary control information. In some embodiments, packets may be classified for transmission in accordance with application type, QoS parameters, and other properties. In some embodiments, improved control messages may be constructed to facilitate the control process and minimize associated overhead.

Claim 7 of the ’450 Patent is an illustrative claim and recites the

following elements (disputed or identified terms in italics):

7. A mobile device in a wireless packet system using a frame structure of multiple frames for transmission, each frame comprising a plurality of time intervals, each time interval comprising a plurality of orthogonal frequency division multiplexing (OFDM) symbols, and each OFDM symbol containing a plurality of frequency subcarriers, the mobile device configured to:
 - receive an identifier from a base station in a cell in which the mobile device is operating; and
 - receive a signal containing information from the base station over a segment of time-frequency resource, the segment having a starting *time-frequency coordinate* and the segment comprising N *time-frequency resource units* within a time interval, each unit containing a set of frequency subcarriers in a group of OFDM symbols, where N=2, 4, or 8; and
 - recover the information from the received signal using the starting *time-frequency coordinate* and N in conjunction with the received identifier.

The '512 Patent is titled "Method And Apparatus Using Cell-specific And Common Pilot Subcarriers In Multi-carrier, Multi Cell Wireless Communication Networks," was filed on September 4, 2020, and issued on March 30, 2021. The '512 Patent relates to "pilot subcarriers [that] are divided into two different groups according to their functionalities, and hence their distinct requirements." '512 Patent at 3:10–12. In particular, "[t]he first group is called 'cell-specific pilot subcarriers,' and will be used

by the receiver 104 to extract information unique to each individual cell,” and “[t]he second group is termed ‘common pilot sub-carriers,’ and are designed to possess a set of characteristics common to all base stations of the system.” *Id.* at 3:17–27.

The Abstract of the ’512 Patent states:

A multi-carrier cellular wireless network (400) employs base stations (404) that transmit two different groups of pilot subcarriers: (1) cell-specific pilot subcarriers, which are used by a receiver to extract information unique to each individual cell (402), and (2) common pilots subcarriers, which are designed to possess a set of characteristics common to all the base stations (404) of the system. The design criteria and transmission formats of the cell-specific and common pilot subcarriers are specified to enable a receiver to perform different system functions. The methods and processes can be extended to other systems, such as those with multiple antennas in an individual sector and those where some subcarriers bear common network/system information.

Claim 15 of the ’512 Patent is an illustrative claim and recites the following elements (disputed or identified terms in italics):

15. An orthogonal frequency division multiple access (OFDMA)-compatible mobile station that uses subcarriers in a frequency domain and time slots in a time domain, the OFDMA-compatible mobile station comprising:

at least one antenna; and

a receiver; and

the at least one antenna and the receiver are

configured to:

receive first pilots of a first type on a first plurality of subcarriers, wherein the first pilots are cell-specific pilots; and

receive *second pilots of a second type* and data on a second plurality of subcarriers, *wherein the first plurality of subcarriers and the second plurality of subcarriers are received in at least one of the time slots*;

wherein at least some subcarriers of the first plurality of subcarriers or the second plurality of subcarriers are beam-formed; and

the receiver is further configured to:

recover the data using channel estimates from at least the second pilots; and

recover cell-specific information using the cell-specific pilots;

wherein the second type is different than the first type and wherein the first pilots do not interfere with the second pilots.

II. APPLICABLE LAW

A. Claim Construction

“It is a ‘bedrock principle’ of patent law that ‘the claims of a patent define the invention to which the patentee is entitled the right to exclude.’” *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (en banc) (quoting *Innova/Pure Water Inc. v. Safari Water Filtration Sys., Inc.*, 381 F.3d 1111, 1115 (Fed. Cir. 2004)). To determine the meaning of the claims, courts start by considering the intrinsic evidence. *Id.* at 1313; *C.R. Bard, Inc. v. U.S. Surgical Corp.*, 388 F.3d 858, 861 (Fed. Cir. 2004);

Bell Atl. Network Servs., Inc. v. Covad Commc'ns Grp., Inc., 262 F.3d 1258, 1267 (Fed. Cir. 2001). The intrinsic evidence includes the claims themselves, the specification, and the prosecution history. *Phillips*, 415 F.3d at 1314; *C.R. Bard, Inc.*, 388 F.3d at 861. The general rule—subject to certain specific exceptions discussed *infra*—is that each claim term is construed according to its ordinary and accustomed meaning as understood by one of ordinary skill in the art at the time of the invention in the context of the patent. *Phillips*, 415 F.3d at 1312–13; *Alloc, Inc. v. Int'l Trade Comm'n*, 342 F.3d 1361, 1368 (Fed. Cir. 2003); *Azure Networks, LLC v. CSR PLC*, 771 F.3d 1336, 1347 (Fed. Cir. 2014) (quotation marks omitted) (“There is a heavy presumption that claim terms carry their accustomed meaning in the relevant community at the relevant time.”) *cert. granted, judgment vacated*, 135 S. Ct. 1846 (2015).

“The claim construction inquiry ... begins and ends in all cases with the actual words of the claim.” *Renishaw PLC v. Marposs Societa' per Azioni*, 158 F.3d 1243, 1248 (Fed. Cir. 1998). “[I]n all aspects of claim construction, ‘the name of the game is the claim.’” *Apple Inc. v. Motorola, Inc.*, 757 F.3d 1286, 1298 (Fed. Cir. 2014) (quoting *In re Hiniker Co.*, 150 F.3d 1362, 1369 (Fed. Cir. 1998)) *overruled on other grounds by*

Williamson v. Citrix Online, LLC, 792 F.3d 1339 (Fed. Cir. 2015). First, a term’s context in the asserted claim can be instructive. *Phillips*, 415 F.3d at 1314. Other asserted or unasserted claims can also aid in determining the claim’s meaning, because claim terms are typically used consistently throughout the patent. *Id.* Differences among the claim terms can also assist in understanding a term’s meaning. *Id.* For example, when a dependent claim adds a limitation to an independent claim, it is presumed that the independent claim does not include the limitation. *Id.* at 1314–15.

“[C]laims ‘must be read in view of the specification, of which they are a part.’” *Id.* (quoting *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 979 (Fed. Cir. 1995) (en banc)). “[T]he specification ‘is always highly relevant to the claim construction analysis. Usually, it is dispositive; it is the single best guide to the meaning of a disputed term.’” *Id.* (quoting *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996)); *Teleflex, Inc. v. Ficosa N. Am. Corp.*, 299 F.3d 1313, 1325 (Fed. Cir. 2002). This is true because a patentee may define his own terms, give a claim term a different meaning than the term would otherwise possess, or

disclaim or disavow the claim scope. *Phillips*, 415 F.3d at 1316. In these situations, the inventor’s lexicography governs. *Id.*

The specification may also resolve ambiguous claim terms “where the ordinary and accustomed meaning of the words used in the claims lack sufficient clarity to permit the scope of the claim to be ascertained from the words alone.” *Teleflex, Inc.*, 299 F.3d at 1325. But, “[a]lthough the specification may aid the court in interpreting the meaning of disputed claim language, particular embodiments and examples appearing in the specification will not generally be read into the claims.” *Comark Commc’ns, Inc. v. Harris Corp.*, 156 F.3d 1182, 1187 (Fed. Cir. 1998) (quoting *Constant v. Advanced Micro-Devices, Inc.*, 848 F.2d 1560, 1571 (Fed. Cir. 1988)); *see also Phillips*, 415 F.3d at 1323. “[I]t is improper to read limitations from a preferred embodiment described in the specification—even if it is the only embodiment—into the claims absent a clear indication in the intrinsic record that the patentee intended the claims to be so limited.” *Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 913 (Fed. Cir. 2004).

The prosecution history is another tool to supply the proper context for claim construction because, like the specification, the prosecution

history provides evidence of how the U.S. Patent and Trademark Office (“PTO”) and the inventor understood the patent. *Phillips*, 415 F.3d at 1317. However, “because the prosecution history represents an ongoing negotiation between the PTO and the applicant, rather than the final product of that negotiation, it often lacks the clarity of the specification and thus is less useful for claim construction purposes.” *Id.* at 1318; *see also Athletic Alts., Inc. v. Prince Mfg.*, 73 F.3d 1573, 1580 (Fed. Cir. 1996) (ambiguous prosecution history may be “unhelpful as an interpretive resource”).

Although extrinsic evidence can also be useful, it is “less significant than the intrinsic record in determining the legally operative meaning of claim language.” *Phillips*, 415 F.3d at 1317 (quoting *C.R. Bard, Inc.*, 388 F.3d at 862). Technical dictionaries and treatises may help a court understand the underlying technology and the manner in which one skilled in the art might use claim terms, but technical dictionaries and treatises may provide definitions that are too broad or may not be indicative of how the term is used in the patent. *Id.* at 1318. Similarly, expert testimony may aid a court in understanding the underlying technology and determining the particular meaning of a term in the

pertinent field, but an expert’s conclusory, unsupported assertions as to a term’s definition are not helpful to a court. *Id.* Extrinsic evidence is “less reliable than the patent and its prosecution history in determining how to read claim terms.” *Id.* The Supreme Court has explained the role of extrinsic evidence in claim construction:

In some cases, however, the district court will need to look beyond the patent’s intrinsic evidence and to consult extrinsic evidence in order to understand, for example, the background science or the meaning of a term in the relevant art during the relevant time period. *See, e.g., Seymour v. Osborne*, 11 Wall. 516, 546 (1871) (a patent may be “so interspersed with technical terms and terms of art that the testimony of scientific witnesses is indispensable to a correct understanding of its meaning”). In cases where those subsidiary facts are in dispute, courts will need to make subsidiary factual findings about that extrinsic evidence. These are the “evidentiary underpinnings” of claim construction that we discussed in *Markman*, and this subsidiary factfinding must be reviewed for clear error on appeal.

Teva Pharm. USA, Inc. v. Sandoz, Inc., 574 U.S. 318, 331–32 (2015).

B. Departing from the Ordinary Meaning of a Claim Term

There are “only two exceptions to [the] general rule” that claim terms are construed according to their plain and ordinary meaning: “1) when a patentee sets out a definition and acts as his own lexicographer, or 2) when the patentee disavows the full scope of the claim term either

in the specification or during prosecution.”² *Golden Bridge Tech., Inc. v. Apple Inc.*, 758 F.3d 1362, 1365 (Fed. Cir. 2014) (quoting *Thorner v. Sony Comput. Entm’t Am. LLC*, 669 F.3d 1362, 1365 (Fed. Cir. 2012)); *see also GE Lighting Sols., LLC v. AgiLight, Inc.*, 750 F.3d 1304, 1309 (Fed. Cir. 2014) (“[T]he specification and prosecution history only compel departure from the plain meaning in two instances: lexicography and disavowal.”). The standards for finding lexicography or disavowal are “exacting.” *GE Lighting Sols.*, 750 F.3d at 1309.

To act as his own lexicographer, the patentee must “clearly set forth a definition of the disputed claim term,” and “clearly express an intent to define the term.” *Id.* (quoting *Thorner*, 669 F.3d at 1365); *see also Renishaw*, 158 F.3d at 1249. The patentee’s lexicography must appear “with reasonable clarity, deliberateness, and precision.” *Renishaw*, 158 F.3d at 1249.

To disavow or disclaim the full scope of a claim term, the patentee’s statements in the specification or prosecution history must amount to a

² Some cases have characterized other principles of claim construction as “exceptions” to the general rule, such as the statutory requirement that a means-plus-function term is construed to cover the corresponding structure disclosed in the specification. *See, e.g., CCS Fitness, Inc. v. Brunswick Corp.*, 288 F.3d 1359, 1367 (Fed. Cir. 2002).

“clear and unmistakable” surrender. *Cordis Corp. v. Bos. Sci. Corp.*, 561 F.3d 1319, 1329 (Fed. Cir. 2009); *see also Thorner*, 669 F.3d at 1366 (“The patentee may demonstrate intent to deviate from the ordinary and accustomed meaning of a claim term by including in the specification expressions of manifest exclusion or restriction, representing a clear disavowal of claim scope.”). “Where an applicant’s statements are amenable to multiple reasonable interpretations, they cannot be deemed clear and unmistakable.” *3M Innovative Props. Co. v. Tredegar Corp.*, 725 F.3d 1315, 1326 (Fed. Cir. 2013).

C. Definiteness Under 35 U.S.C. § 112, ¶ 2 (pre-AIA) / § 112(b) (AIA)

Patent claims must particularly point out and distinctly claim the subject matter regarded as the invention. 35 U.S.C. § 112, ¶ 2. A claim, when viewed in light of the intrinsic evidence, must “inform those skilled in the art about the scope of the invention with reasonable certainty.” *Nautilus Inc. v. Biosig Instruments, Inc.*, 572 U.S. 898, 910 (2014). If it does not, the claim fails § 112, ¶ 2 and is therefore invalid as indefinite. *Id.* at 901. Whether a claim is indefinite is determined from the perspective of one of ordinary skill in the art as of the time the application for the patent was filed. *Id.* at 911. As it is a challenge to the validity of a

patent, the failure of any claim in suit to comply with § 112 must be shown by clear and convincing evidence. *BASF Corp. v. Johnson Matthey Inc.*, 875 F.3d 1360, 1365 (Fed. Cir. 2017). “[I]ndefiniteness is a question of law and in effect part of claim construction.” *ePlus, Inc. v. Lawson Software, Inc.*, 700 F.3d 509, 517 (Fed. Cir. 2012).

When a term of degree is used in a claim, “the court must determine whether the patent provides some standard for measuring that degree.” *Biosig Instruments, Inc. v. Nautilus, Inc.*, 783 F.3d 1374, 1378 (Fed. Cir. 2015) (quotation marks omitted). Likewise, when a subjective term is used in a claim, “a court must determine whether the patent’s specification supplies some standard for measuring the scope of the [term].” *Ernie Ball, Inc. v. Earvana, LLC*, 502 F. App’x 971, 980 (Fed. Cir. 2013) (citations omitted). The standard “must provide objective boundaries for those of skill in the art.” *Interval Licensing LLC v. AOL, Inc.*, 766 F.3d 1364, 1371 (Fed. Cir. 2014).

III. LEVEL OF ORDINARY SKILL IN THE ART

It is well established that patents are interpreted from the perspective of a person of ordinary skill in the art (“POSITA”). See *Phillips*, 415 F.3d at 1313 (“[T]he ordinary and customary meaning of a

claim term is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention, i.e., as of the effective filing date of the patent application.”). The Federal Circuit has advised that the “[f]actors that may be considered in determining the level of skill in the art include: (1) the educational level of the inventors; (2) the type of problems encountered in the art; (3) prior art solutions to those problems; (4) the rapidity with which innovations are made; (5) sophistication of the technology; and (6) education level of active workers in the field.” *Env’tl Designs, Ltd. v. Union Oil Co. of California*, 713 F.2d 693, 696 (Fed. Cir. 1983). “These factors are not exhaustive but are merely a guide to determining the level of ordinary skill in the art.” *Daiichi Sankyo Co. Ltd. v. Apotex, Inc.*, 501 F.3d 1254, 1256 (Fed. Cir. 2007).

Plaintiff contends that a person of ordinary skill in the art “at the time of the invention would have a Bachelor of Science degree or higher in Electrical Engineering with 2 or more years of experience designing or implementing wireless telecommunications systems or transceivers.” (ECF 127, PageID.9005) (citing ECF 127-3, PageID.9062 (Alberth Dec. ¶ 18)). Defendants contend that a person of ordinary skill in the art “would have a bachelor’s degree in electrical engineering, computer engineering,

computer science, or an equivalent field, or an advanced degree in those fields, as well as at least 3-5 years of academic or industry experience in mobile wireless communications, or comparable industry experience.” (ECF 131, PageID.9096-97) (citing ECF 131-2, PageID.9159-60 (Akl Dec. ¶¶ 28-29))

Having considered the parties’ proposals, and the factors that may be considered in determining the level of skill in the art, the Court finds that a person of ordinary skill in the art would have a bachelor’s degree in electrical engineering, computer engineering, computer science, or an equivalent field, or an advanced degree in those fields, as well as 2 or more years of experience in mobile wireless communications, or comparable industry experience. The Court notes that any differences in the parties’ proposals do not appear to be significant for the purpose of claim construction.

IV. THE PARTIES’ STIPULATED TERMS

The parties agreed to the following constructions:

Claim Term/Phrase	Agreed Construction
“In a multi-cell orthogonal frequency division multiple access (OFDMA) wireless communication system comprising a plurality of base	The preamble is limiting. Plain and ordinary meaning.

stations and mobile stations, a mobile station configured to communicate with a serving base station in a cell via a communication channel, the mobile station comprising:” '366 Patent: Claim 1	
“In an orthogonal frequency division multiple access (OFDMA) wireless communication system, a method for signal transmission by a mobile station to a serving base station via a communication channel, the method comprising:” '366 Patent: Claim 17	The preamble is limiting. Plain and ordinary meaning.
“A mobile station comprising:” '908 Patent: Claim 1	The preamble is limiting. Plain and ordinary meaning.
“A mobile device in a wireless packet system using a frame structure of multiple frames for transmission, each frame comprising a plurality of time intervals, each time interval comprising a plurality of orthogonal frequency division multiplexing (OFDM) symbols, and each OFDM symbol containing a plurality of frequency subcarriers, the mobile device configured to:” '450 Patent: Claim 7	The preamble is limiting. Plain and ordinary meaning.

<p>“A link adaption method by a mobile station served by a serving base station in an Orthogonal Frequency Division Multiplexing (OFDM) communication system, the communication system utilizing a transmission structure with time slots in the time domain and frequency subchannels in the frequency domain, the method comprising:”</p> <p>’941 Patent: Claim 8</p>	<p>The preamble is limiting. Plain and ordinary meaning.</p>
<p>“A mobile station served by a serving base station in an Orthogonal Frequency Division Multiplexing (OFDM) communication system, the communication system utilizing a transmission structure with time slots in the time domain and frequency subchannels in the frequency domain, the mobile station comprising a receiver configured to:”</p> <p>’941 Patent: Claim 13</p>	<p>The preamble is limiting. Plain and ordinary meaning.</p>
<p>“A mobile device in an Orthogonal Frequency Division Multiplexing (OFDM) communication system, the mobile device comprising”</p> <p>’302 Patent: Claim 23</p>	<p>The preamble is limiting. Plain and ordinary meaning.</p>

<p>“An orthogonal frequency division multiple access (OFDMA)-compatible mobile station that uses subcarriers in a frequency domain and time slots in a time domain, the OFDMA-compatible mobile station comprising:”</p> <p>’512 Patent: Claim 15</p>	<p>The preamble is limiting. Plain and ordinary meaning.</p>
<p>“A method performed by an orthogonal frequency division multiple access (OFDMA)-compatible mobile station that uses subcarriers in a frequency domain and time slots in a time domain, the method comprising:”</p> <p>’512 Patent: Claim 23</p>	<p>The preamble is limiting. Plain and ordinary meaning.</p>
<p>“time-frequency coordinate”</p> <p>’450 Patent: Claim 7</p>	<p>“one-dimensional time frequency coordinate”</p>
<p>“wherein modular coding is applied to the time-frequency resource units in the segment of time-frequency resource”</p> <p>’450 Patent: Claim 11</p>	<p>“wherein a modular coding scheme is applied to the time-frequency resource units in the segment of time-frequency resource”</p>
<p>“configured to”</p> <p>’366 Patent: Claims 1 & 5; ’908 Patent: Claims 1–3 & 9; ’450 Patent: Claim 7; ’941 Patent: Claims 13 & 14; ’302 Patent: Claim 23; ’512 Patent: Claim 15</p>	<p>“designed to”</p>

ECF 131, Page ID.9093-94; ECF 114-1, PageID.8773-78. The Court hereby **ADOPTS** the parties' agreed constructions.

V. CONSTRUCTION OF DISPUTED TERMS

The Court addresses the meaning and scope of the following fourteen terms/phrases in the Asserted Patents.

A. “the ranging signal exhibits a low peak-to-average power ratio in the time domain”

<u>Disputed Term</u>	<u>Plaintiff's Proposal</u>	<u>Defendants' Proposal</u>	<u>Court's Construction</u>
“the ranging signal exhibits a low peak-to-average power ratio in the time domain” '366 Patent: Claims 1 & 17	Plain and ordinary meaning. No construction necessary. Alternatively, to the extent construction is deemed necessary, “exhibits a low peak-to-average power ratio in the time domain” means “exhibits a peak-to-average power ratio in the time domain of 9dBs or less.”	Indefinite.	Indefinite.

1. Analysis

The phrase “the ranging signal exhibits a low peak-to-average power ratio in the time domain” appears in Claims 1 and 17 of the '366 Patent. The Court finds that the phrase is used consistently in the claims and is intended to have the same general meaning in each claim. The

parties dispute whether the phrase is indefinite under 35 U.S.C. § 112 ¶ 2 for failing to “particularly point[] out and distinctly claim[] the subject matter” regarded as the invention.

Section 112 requires that a patent specification “conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the [applicant] regards as the invention.” The Supreme Court has read this provision to require that “a patent’s claims, viewed in light of the specification and prosecution history, inform those skilled in the art about the scope of the invention with reasonable certainty.” *Nautilus, Inc. v. Biosig Instruments, Inc.*, 572 U.S. 898, 901 (2014); *Eli Lilly & Co. v. Teva Parenteral Meds., Inc.*, 845 F.3d 1357, 1370 (Fed. Cir. 2017). The definiteness requirement of Section 112 strikes a “delicate balance” between “the inherent limitations of language” and providing “clear notice of what is claimed.” *Sonix Tech. Co. v. Publ’ns Int’l, Ltd.*, 844 F.3d 1370, 1377 (Fed. Cir. 2017) (citing *Nautilus*, 134 S. Ct. at 2129).

The Supreme Court has recognized that “absolute precision is unattainable.” *Sonix Tech.*, 844 F.3d at 1377. “[T]he certainty which the law requires in patents is not greater than is reasonable, having regard

to their subject-matter.” *Id.* Thus, “a patentee need not define his invention with mathematical precision in order to comply with the definiteness requirement.” *Id.* (citing *Invitrogen Corp. v. Biocrest Mfg., L.P.*, 424 F.3d 1374, 1384 (Fed. Cir. 2005)). Accordingly, the Federal Circuit has rejected the proposition that claims involving terms of degree are inherently indefinite. *Sonix Tech.*, 844 F.3d at 1377 (citing *Interval Licensing LLC v. AOL, Inc.*, 766 F.3d 1364, 1368-74 (Fed. Cir. 2014)). “Claim language employing terms of degree has long been found definite where it provided enough certainty to one of skill in the art when read in the context of the invention.” *Sonix Tech.*, 844 F.3d at 1377 (citing *Interval Licensing*, 766 F.3d at 1370)).

That said, the claims must “inform those skilled in the art about the scope of the invention with reasonable certainty,” in light of the specification and prosecution history. *Nautilus*, 572 U.S. at 910. This standard requires that a patent must “be precise enough to afford clear notice of what is claimed, thereby apprising the public of what is still open to them.” *Id.* at 909 (cleaned up). In other words, “[t]he claims, when read in light of the specification and the prosecution history, must provide objective boundaries for those of skill in the art.” *Interval Licensing*, 766

F.3d at 1371.

Finally, indefiniteness is a question of law for the court to evaluate from the perspective of someone skilled in the relevant art at the time the patent was filed. *H-WTech., L.C v. Overstock.com, Inc.*, 758 F.3d 1329, 1332 (Fed. Cir. 2014). As the parties challenging validity, Defendants bear the burden of demonstrating that a claim is indefinite by clear and convincing evidence. *Warsaw Orthopedic, Inc. v. NuVasive, Inc.*, 778 F.3d 1365, 1371 (Fed. Cir. 2015); *Sonix Tech.*, 844 F.3d at 1377.

Turning to the disputed term, every asserted claim of the '366 Patent requires a “ranging signal [that] exhibits a *low* peak-to-average power ratio in the time domain.” (emphasis added). The term peak-to-average power ratio (“PAPR”) is not disputed, and refers to a measurement that is quantified in decibels (“dB”). Instead, Defendants contend that the intrinsic evidence does not provide any insight into what constitutes a “low” PAPR. ECF 131, PageID.9098.

Defendants argue that term is indefinite because there is no “point of comparison for skilled artisans to determine an objective boundary” for what constitutes a low peak-to-average power ratio. ECF 131, PageID.9097 (citing *Berkheimer v. HP Inc.*, 881 F.3d 1360, 1363–64 (Fed.

Cir. 2018)). Defendants further contend that when the claims use a word of degree (such as “low”), “the court must determine whether the patent provides some standard for measuring that degree.” ECF 131, PageID.9097 (citing *Nautilus*, 783 F.3d at 1378) (quotations and citations omitted). According to Defendants, the specification does not provide any guidance on the scope of the term “low peak-to-average power ratio.” ECF 131, PageID.9097.

Plaintiff responds that in evaluating a term of degree, “absolute or mathematical precision is not required[.]” ECF 127, PageID.9006 (citing *Interval Licensing*, 766 F.3d at 1370). Plaintiff argues that “[w]here intrinsic evidence provides some guidance as to the scope of such terms, the Federal Circuit has held they satisfy the definiteness requirement under Section 112.” ECF 127, PageID.9006 (citing *Tecnomatic S.p.A. v. ATOP S.p.A.*, No. 18-12869, 2021 WL 1410036, at *20 (E.D. Mich. Feb. 23, 2021), adopted by 2021 WL 2309933 (E.D. Mich. June 7, 2021)). Referring to Claim 1, Plaintiff further argues that a POSITA would know to evaluate the PAPR relative to the PAPRs typically found in that specific subset of systems encompassed by the claims, and the specific OFDMA system being implemented. ECF 127, PageID.9007.

According to Plaintiff, a POSITA would know that a “low” PAPR is one that falls below the baseline for a given system, so that the transmitter does not have to be designed for the special case of this one signal. ECF 127, PageID.9007 (citing ECF 127-3, PageID.9063-64 (Alberth Decl. ¶¶ 24–25)). Citing to extrinsic evidence, Plaintiff contends that it is one example of a cellular system using conventional OFDMA at the time of the invention. According to Plaintiff’s expert, this extrinsic evidence shows that this OFDMA system has a baseline PAPR of approximately 12dBs. ECF 127, PageID.9007 (citing ECF 127-3, PageID.9064 (Alberth Decl. ¶25)). Plaintiff argues that a POSITA would recognize that a reduction of 3dBs or more would result in a “low” PAPR of 9dBs. ECF 127, PageID.9008 (citing ECF 127-3, PageID.9064-65 (Alberth Decl. ¶¶ 25–26)).

Plaintiff further contends that the specification provides additional objective criteria when it explains that a “relatively low peak-to-average power ratio ... improves the power efficiency of the mobile station transmission power amplifier.” ECF 127, PageID.9008 (citing ’366 Patent 4:34–38). According to Plaintiff, the specification’s discussion of improving power efficiency provides guidance as to the meaning of “low

PAPR.” ECF 127, PageID.9009. Plaintiff argues that it is entirely appropriate for a patent to use language designed not to employ a strict numerical boundary. *Id.* (citing *Braintree Labs., Inc. v. Novel Labs., Inc.*, 749 F.3d 1349, 1360 (Fed. Cir. 2014)).

In the alternative, Plaintiff contends that although other types of OFDMA systems are contemplated by the claims, the most common conventional OFDMA cellular system at the time of the patent would have a baseline PAPR of approximately 12dBs. ECF 127, PageID.9010 (citing ECF 127-3, PageID.9065 (Alberth Decl. ¶¶ 26–27)). Assuming this baseline, Plaintiff argues that a “low” PAPR would be a PAPR of 9dBs or less, which would correspond to a marked reduction of the PAPR that practically impacts the transmission efficiency and does not require special attention in designing the transmitter in that conventional OFDMA system. ECF 127, PageID.9010 (citing ECF 127-3, PageID.9063–65 (Alberth Decl. ¶¶ 22–28)).

The Court finds that neither the intrinsic or extrinsic evidence provides objective boundaries for the term “low peak-to-average power ratio.” The term appears only one time in the specification. Specifically, the specification states that “the ranging sequence is designed such that

its corresponding time-domain signal exhibits relatively low peak-to-average power ratio.” ’366 Patent at 4:34–37. This fails to provide any guidance on what qualifies as a “relatively low” or “low” PAPR. Instead, the passage injects more uncertainty by introducing the phrases “relatively” low PAPR, and “improve[d]” power efficiency, without specifying any standard against which these parameters are measured.

The prosecution history further indicates that the term is indefinite. In related Application No. 16/544,201, which shares the same specification as the ’366 Patent, the PTO found “low peak to average ratio” indefinite because “it is unclear how low the ratio should be to be considered ‘low’ as claimed.” ECF 131-3, PageID.9342 (December 21, 2020 Off. Action).

In another related application (No. 13/246,677), the PTO again found “low peak-to-average power ratio” indefinite because “the claims are incomplete, omitting elements of the claimed ratios and criteria for ratios to be considered ‘high’ and ratios considered ‘low.’” ECF 131-4, PageID.9367–68 (Oct. 31, 2013 Off. Action), ECF 131-4, PageID.9383–84 (May 12, 2014 Off. Action). Echoing what Plaintiff contends here, the patentees told the PTO that the term was definite because certain third-

party publications referred to “high” and “low” ratios.” ECF 131-4, PageID.9376 (April 30, 2014 Resp. to Off. Action).

The examiner found the publications irrelevant, and explained that “these general terms should be identified in current applications and cannot be interpreted in the context of the design without comparing the values with a threshold or a level, identified in the current application.” ECF 131-4, PageID.9387 (May 12, 2014 Off. Action). The Court finds the examiner’s reasoning persuasive.

Similarly, the extrinsic evidence also supports finding that the claim term is indefinite. While PAPR is a measurement that is quantified in decibels, the evidence before the Court indicates that there is no industry standard for a “low” PAPR. Indeed, Plaintiff’s expert acknowledges that “different specific implementations of OFDM/OFDMA networks could have different baseline PAPRs.” ECF 127-3, PageID.9065 (Alberth Decl. ¶ 27). In an attempt to establish a baseline, Plaintiff’s expert references two publications and picks a “baseline PAPR” of “approximately 12dBs.” ECF 127-3, PageID.9064 (Alberth Decl. ¶ 25). He then opines “that a ‘low’ PAPR for a conventional OFDMA system would be a PAPR of 9dBs or less.” ECF 127-3, PageID.9065 (Alberth Decl. ¶ 26). However, these

numbers are simply one interpretation of one set of data, which is not an objective boundary for what qualifies as a low PAPR.

Finally, the two cases cited by Plaintiff are distinguishable. *Tecnomatic* provided a specific comparison point, and *St. Lawrence* provided an equation. *Tecnomatic S.p.A. v. ATOP S.p.A.*, No. 18-12869, 2021 U.S. Dist. LEXIS 74390, at *61–62 (E.D. Mich. Feb. 23, 2021); *Saint Lawrence Communs. LLC v. ZTE Corp.*, Nos. 15-349, 15-349, 2016 U.S. Dist. LEXIS 147596, at *185–86 (E.D. Tex. Oct. 24, 2016). In contrast, neither the surrounding claim language nor the claimed implementation here provide guidance as to what qualifies as low PAPR. Because neither the intrinsic nor extrinsic evidence informs those skilled in the art about the scope of the invention with reasonable certainty, the Court finds that Defendants proved by clear and convincing evidence that the claim language is indefinite.

2. Court's Construction

The phrase “**the ranging signal exhibits a low peak-to-average power ratio in the time domain**” is **indefinite** for failing to inform, with reasonable certainty, those skilled in the art about the scope of the invention.

B. “a ranging sequence selected from a set of ranging sequences”

<u>Disputed Term</u>	<u>Plaintiff’s Proposal</u>	<u>Defendants’ Proposal</u>	<u>Court’s Construction</u>
“a ranging sequence selected from a set of ranging sequences” ’366 Patent: Claims 1 & 17	Plain and ordinary meaning. No construction necessary.	“a ranging sequence selected by said apparatus from a set of ranging sequences”	Plain and ordinary meaning.

1. Analysis

The phrase “a ranging sequence selected from a set of ranging sequences” appears in Claims 1 and 17 of the ’366 Patent. The Court finds that the phrase is used consistently in the claims and is intended to have the same general meaning in each claim. The parties dispute whether the recited “ranging sequence” must be “selected by said apparatus,” as Defendants propose.

Independent Claim 17 recites a “method for signal transmission by a mobile station to a serving base station.” Independent Claim 1 recites a “mobile station configured to communicate with a serving base station in a cell.” Defendants contend that both claims require the mobile station (or its apparatus) to transmit a data signal and a ranging signal to the

serving base station. ECF 131, PageID.9102. Defendants argue that given this context, the claim language requires the mobile station (or its apparatus) to select the ranging sequences. ECF 131, PageID.9102. Defendants further argue that the specification only discloses the mobile station choosing the ranging sequence, without describing any selection by the base station. ECF 131, PageID.9103 (citing '366 Patent at 3:45–46).

The Court finds that Defendants' construction would improperly limit the claims to a particular embodiment disclosed in the specification. As discussed above, Claims 1 and 17 recite a mobile station that sends a ranging signal to a base station. The claimed ranging signal is “formed from a ranging sequence selected from a set of ranging sequences associated with the cell for identifying the mobile station.” This claim language indicates that the purpose of a ranging signal is to allow a mobile station and base station to initiate communication with one another. Thus, the ranging sequence that is used by the mobile station to form the ranging signal cannot be just any sequence, but instead must be from a particular set so that the sequence can identify the mobile station to the base station. *See, e.g.*, '366 Patent 3:43–47 (explaining how

“multiple ranging sequences are permitted in a cell” and how the mobile station “uses the sequence to identify itself in the initial communication with a base station”). This is the reason Defendants’ construction attempts to read this limitation into the claims. However, there is nothing in the claim language that requires limiting the claims to the mobile station selecting the ranging sequence.

Defendants are correct that the specification discloses an embodiment where the mobile station, not the base station, chooses a ranging sequence. ’366 Patent at 3:45–46 (“A mobile station chooses a ranging sequence for random access and uses the sequence to identify itself in the initial communication with a base station.”). However, it is well established that it is impermissible to import limitations into claims from examples in the specification, unless the specification and/or prosecution history makes very clear that the patent intended such limitation. *See, e.g., JVW Enters., Inc. v. Interact Accessories, Inc.*, 424 F.3d 1324, 1335 (Fed. Cir. 2005) (“We do not import limitations into claims from examples or embodiments appearing only in a patent's written description, even when a specification describes very specific embodiments of the invention or even describes only a single

embodiment”); *Alloc*, 342 F.3d at 1370 (“[I]t is impermissible to read the one and only disclosed embodiment into a claim without other indicia that the patentee so intended to limit the invention.”).

There is no disclosure in that portion of the specification, or anywhere in the record, that the claimed mobile station is required to make that selection. Indeed, when drafting the claims, the patentees chose not to include any affirmative selection step in the claimed method, nor identify a particular selector, but instead only required the ranging sequence be “selected from” a set of ranging sequence. *i4i Ltd. P’ship v. Microsoft Corp.*, 598 F.3d 831, 843 (Fed. Cir. 2010) (“Had the inventors intended [the selection to be a step performed by the mobile device], they could have drafted the claims to expressly include it.”). Indeed, a POSITA would understand that the recited base station could make the selection. ECF 127-3, PageID.9065–66 (Alberth Decl. ¶¶ 29–31). Accordingly, the Court rejects Defendants’ construction.

2. Court’s Construction

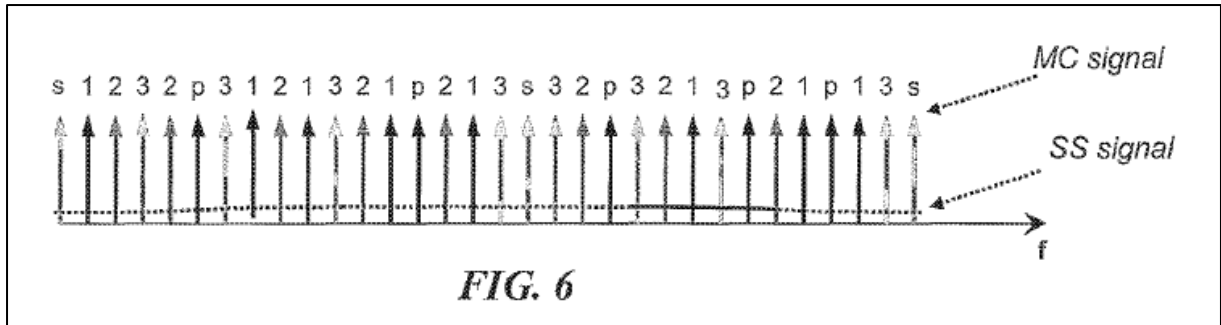
For the reasons set forth above, the phrase “**a ranging sequence selected from a set of ranging sequences**” is given its **plain and ordinary meaning**.

C. “wherein the portion of the frequency band used for transmission of the random access signal does not include control channels”

<u>Disputed Term</u>	<u>Plaintiff’s Proposal</u>	<u>Defendants’ Proposal</u>	<u>Court’s Construction</u>
“wherein the portion of the frequency band used for transmission of the random access signal does not include control channels” ’908 Patent: Claim 4	“wherein the portion of the frequency band used for transmission of the random access signal does not overlap with the portions of the frequency band used for control channels”	“wherein the portion of the frequency band used for transmission of the random access signal does not include channels carrying control information”	“control channel” means “Multi-Carrier (MC) control subchannel”

1. Analysis

The phrase “wherein the portion of the frequency band used for transmission of the random access signal does not include control channels” appears in Claim 4 of the ’908 Patent. The parties dispute the meaning of the term “control channel.” The fundamental aspect of the invention is the concept of overlaying or overlapping a Multi-Carrier (MC) signal with a Direct Sequence Spread Spectrum (DSSS) signal in both the time and frequency domains. Figure 6 illustrates an example of this in the frequency domain:



'908 Patent at Figure 6. The specification describes the advantages and disadvantages of each system (i.e., a DSSS and a MC system). It states that an advantage of a DSSS system is that it is “inherently capable of supporting multi-cell and multi-user access applications through the use of orthogonal spreading codes,” and that “[t]he initial access of the physical channel and frequency planning are relatively easier because of interference averaging.” '908 Patent at 1:35–37.

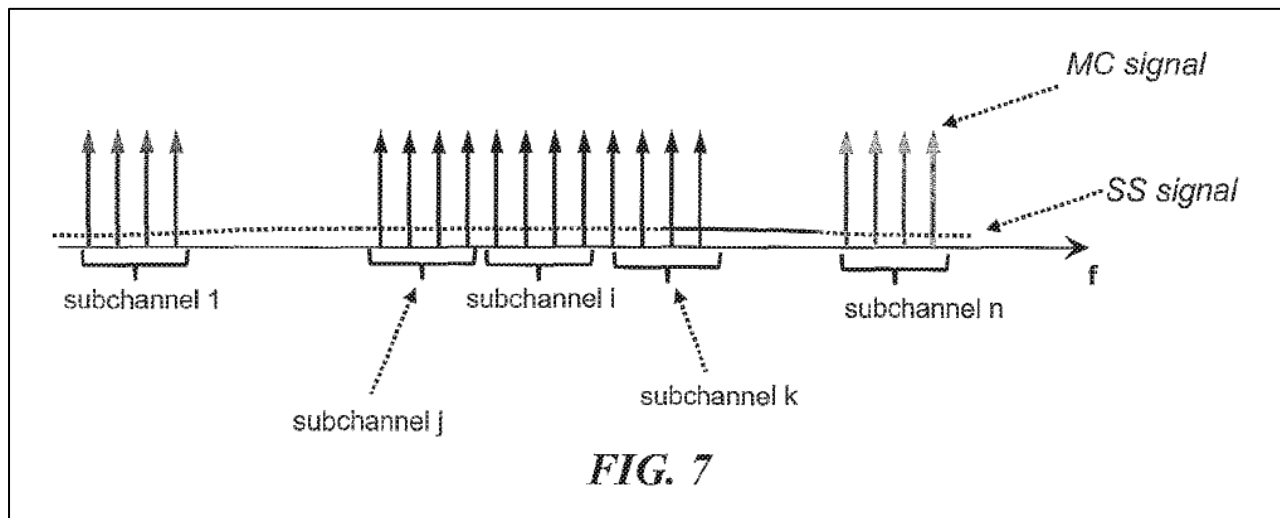
The specification states that a disadvantage of a DSSS system is that it “may suffer severely from the loss of orthogonality in a broadband environment due to multi-path propagation effects, which results in low spectral efficiency.” '908 Patent at 1:38–42. The specification further states that an advantage of an MC system is that it is “capable of supporting broadband applications with higher spectral efficiency ... by using cyclic prefixes to extend the signal period as the data is multiplexed on orthogonal sub-carriers.” '908 Patent at 1:45–51. It then states that a

disadvantage of an MC system is that it is “vulnerable while operating in multi-user and multi-cell environments.” ’908 Patent at 1:56–58.

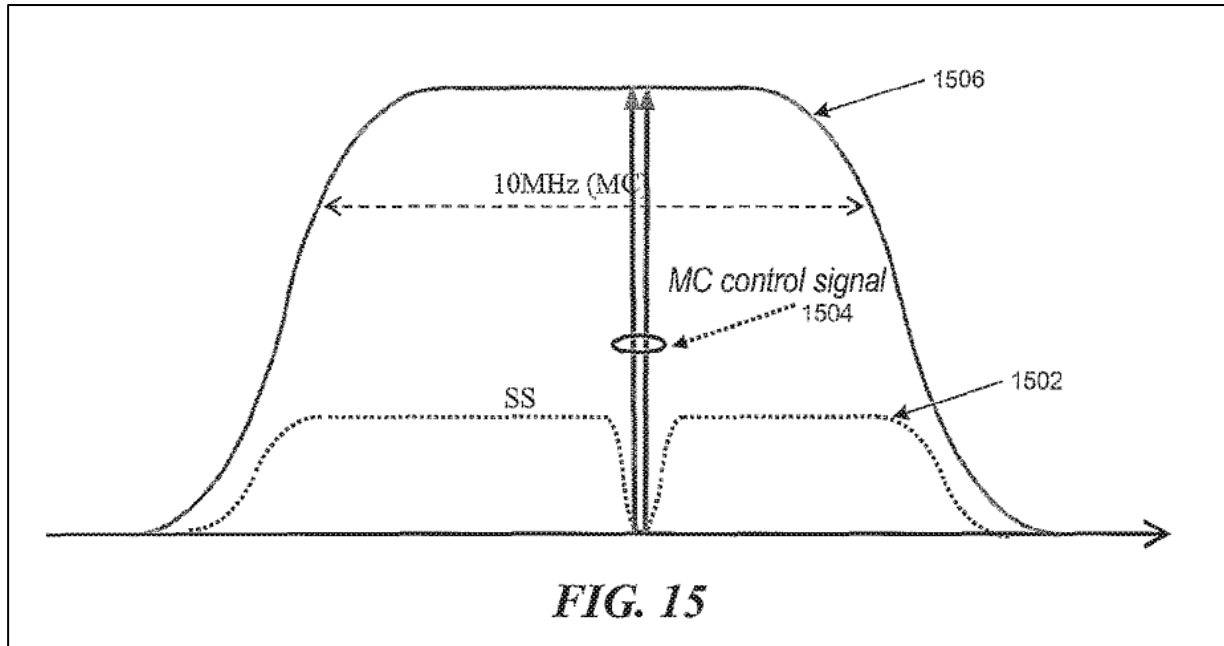
With this background, the specification discloses the invention as “a broadband wireless communication system where both the MC and DSSS signals are intentionally overlaid together in both time and frequency domains” to take advantage of both techniques by “mitigat[ing] their weaknesses.” ’908 Patent at 2:42–47. Specifically, “[t]he MC signal is used to carry broadband data signal for its high spectral efficiency, while the DSSS signal is used for special purpose processing, such as initial random access, channel probing, and short messaging, in which signal properties such as simplicity, self-synchronization, and performance under severe interference are of concern.” ’908 Patent at 2:47–53.

Regarding the disputed claim term “control channel,” the specification states that “[t]he basic structure of a multi-carrier signal in the frequency domain is made up of three types of subcarriers.” ’908 Patent at 3:47–50. The subcarriers include: “1. Data subcarriers, which contain information data; 2. Pilot subcarriers, whose phases and amplitudes are predetermined and made known to all receivers and which are employed for assisting system functions such as estimation of system

parameters; and 3. Silent subcarriers, which have no energy and are used for guard bands and DC carrier.” ’908 Patent at 3:51–58. The specification further discloses an embodiment in Figure 7, “wherein not all MC subchannels are occupied” illustrating “a scenario where some MC subchannels are not energized.” ’908 Patent at 4:55–57.



’908 Patent at Figure 7. Conversely, the specification discloses an embodiment in Figure 15 that “illustrates using spectrum nulls in the DSSS signal 1502 to protect an MC control subchannel.” ’908 Patent at 8:15–16. The specification states that in this embodiment, “the DSSS sequence is designed to have spectrum nulls at MC control subchannels to avoid excess interference with the uplink MC control signals 1504.” ’908 Patent at 8:16–19.



'908 Patent at Figure 15. These embodiments provide the context for the disputed term “control channel.” *Medrad, Inc. v. MRI Devices Corp.*, 401 F.3d 1313, 1319 (Fed. Cir. 2005) (“We cannot look at the ordinary meaning of the term ... in a vacuum. Rather, we must look at the ordinary meaning in the context of the written description and the prosecution history.”) (citing *DeMarini Sports, Inc. v. Worth*, 239 F.3d 1314, 1324 (Fed. Cir. 2001)).

The disputed phrase appears in dependent Claim 4, which depends on Claim 1. Claim 1 recites a “first uplink signal within a frequency band, wherein the first uplink signal is an orthogonal frequency division multiplexing (OFDM) signal,” and “a random access signal followed by a

guard period in only a portion of the frequency band.” A POSITA would understand that the recited “first uplink signal” in Claim 1 is referring to an MC system. Indeed, Defendants note that the specification refers to MC control subchannels as “carrying control information.” ECF 131, PageID.9106 (citing ’908 Patent at 8:27–28). Similarly, a POSITA would understand that the “random access signal” recited in Claim 1 is referring to a DSSS system. As discussed above, this is the invention “where both the MC and DSSS signals are intentionally overlaid together in both time and frequency domains.” ’908 Patent at 2:42–47.

Dependent Claim 4 further requires that “the portion of the frequency band used for transmission of the random access signal does not include control channels.” When considered in the context of the intrinsic evidence, a POSITA would understand that the recited “control channel” in this claim is a “Multi-Carrier (MC) control subchannel” in the MC system. An example of this is illustrated in Figure 7, discussed above, “where some MC subchannels are not energized.” ’908 Patent at 4:55–57. In other words, “the portion of the frequency band used for transmission of the random access signal does not include [Multi-Carrier (MC) control subchannels].” Indeed, the specification explicitly distinguishes “data

subcarriers” from “pilot subcarriers,” and states that “MC” signals are “used for carrying broadband data or control information.” ’908 Patent at Abstract, 8:56–58 (“The initial access DSSS signal arrives at the base station together with MC signals from other mobile stations, each carrying data and control information.”). Accordingly, the Court construes “control channel” to mean “Multi-Carrier (MC) control subchannel.”

Turning to the parties’ constructions, the Court does not adopt Plaintiff’s construction, because it unnecessarily redrafts “include” to mean “overlap with the portions of the frequency band used for.” The term “include” is unambiguous and is easily understandable by a jury. Plaintiff did not provide a persuasive reason for replacing this single word with the ten-word construction it proposes.

Regarding Defendants’ construction, the Court finds that it incorrectly broadens the claim’s negative limitation (i.e., “the portion ... does not include ...”). This results in improperly narrowing the claim’s overall scope. Specifically, Defendants’ construction would mean that any channel that carries some control information is a control channel. This could improperly include data subchannels if they include any “control information.” In other words, if “control channel” is construed as broadly

as Defendants contend, then it could include the entire frequency band, which would leave no frequencies for the random access signal. To be clear, a POSITA would not understand a data subcarrier to be a “control channel,” but Defendants’ construction implies that it could be a “control channel.”

2. Court’s Construction

For the reasons set forth above, the Court construes the term **“control channel”** to mean **“Multi-Carrier (MC) control subchannel.”**

D. “associated with”

<u>Disputed Term</u>	<u>Plaintiff’s Proposal</u>	<u>Defendants’ Proposal</u>	<u>Court’s Construction</u>
“associated with” '908 Patent: Claims: 1–2 & 9	Plain and ordinary meaning. No construction necessary.	“identifying”	Plain and ordinary meaning.

1. Analysis

The term “associated with” appears in Claims 1, 2, and 9 of the '908 Patent. The Court finds that the term is used consistently in the claims and is intended to have the same general meaning in each claim. The parties dispute whether Plaintiff clearly and unmistakably told the PTO

that “associated with” means “identifying” in order to overcome the prior art asserted in the inter partes review (“IPR”) related to its prior litigation against Dell.

The Court finds that Plaintiff did not clearly and unmistakably define “associated with” to mean “identifying” in the Dell IPR. *Zak v. Facebook, Inc.*, No. 15-13437, 2020 U.S. Dist. LEXIS 20074, at *12 (E.D. Mich. Feb. 6, 2020) (“[P]rosecution statements that are vague or ambiguous do not qualify as a disavowal of claim scope. Such disavowing statements must be both clear and deliberate.”) (internal citation omitted). However, Plaintiff clearly and unmistakably told the PTO that “associated with” does not mean “assigned by.” In its IPR, Dell argued that the Walton prior art reference discloses a “MAC ID” assigned to a mobile station by a base station. ECF 131-8, PageID.9520 (Dell IPR Pet.). Dell further argued that Walton’s MAC ID is “associated with” the base station because the base station assigns the MAC ID to the mobile station. *Id.*

To overcome Walton, Plaintiff argued that “[i]t would be illogical to suggest that the MAC ID is “associated with the base station” because it is assigned by the alleged “base station.” ECF 131-10, PageID.9688.

Plaintiff further argued that “[c]laiming that the access point is ‘associated with’ the MAC IDs because it assigns MAC IDs would be at odds with, at the very least, the plain and ordinary meaning of ‘associated with.’” ECF 131-10, PageID.9688.

Plaintiff’s arguments clearly and unmistakably indicate that “associated with” does not mean “assigned by.” It would be “illogical to suggest” otherwise. ECF 131-10, PageID.9688. Indeed, the PTAB stated that the Petitioner did not “sufficiently explain how the assignment of the MAC ID by the access point means that the MAC ID is ‘a sequence associated with the base station’ when Walton teaches that the MAC ID functions to identify a user terminal, not an access point.” ECF 131-12, PageID.9761.

Accordingly, to the extent that Plaintiff argues “associated with” means “assigned by,” the Court rejects that argument. This finding ensures that “the claims are not argued one way in order to maintain their patentability and in a different way against accused infringers.” *Aylus Networks, Inc. v. Apple Inc.*, 856 F.3d 1353, 1360 (Fed. Cir. 2017). Finally, the cases cited by Plaintiff are inapposite, because they did not involve a patentee who disclaimed scope to avoid invalidity during an IPR

proceeding, as in this case.

Defendants cite other portions of Plaintiff's IPR Response and contend that Plaintiff argued that the MAC ID is only "associated with" the mobile station, because the MAC ID identifies the mobile station, and not the base station. ECF 131, PageID.9108 (citing ECF 131-10, PageID.9688-89). Defendants further argue that the PTAB credited Plaintiff's argument that "knowing the MAC ID does not allow for identification of the [base station]." ECF 131, PageID.9108 (citing ECF 131-12, PageID.9762). Defendants contend that Plaintiff is now bound by that construction, because Plaintiff successfully overcame the prior art using this narrow construction. ECF131, PageID.9108.

The Court disagrees that the arguments cited by Defendants rise to the level of clear and unmistakable disclaimer. Defendants suggest that "[e]ven if the Court finds that there has been no unmistakable disavowal of claim scope, Neo's IPR statements still inform the construction." ECF 131, PageID.9108 at n. 6 (citing *Shire Dev., LLC v. Watson Pharms., Inc.*, 787 F.3d 1359, 1366–68 (Fed. Cir. 2015)). For the reasons discussed above, the Court agrees that the IPR statements inform the construction, just not in the manner proposed by Defendants. With this understanding, the

Court rejects Defendants’ construction, and gives the term its plain and ordinary meaning.

2. Court’s Construction

For the reasons set forth above, the term “**associated with**” is given its **plain and ordinary meaning**.

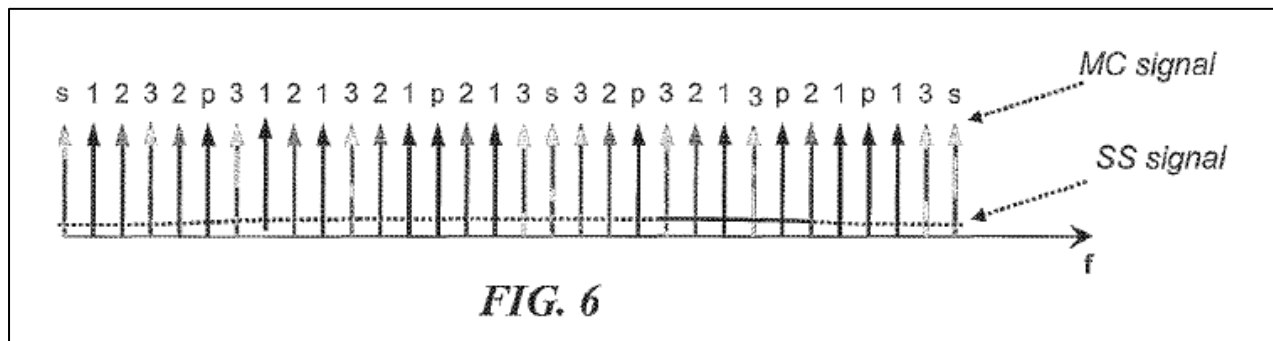
E. “random access signal”

<u>Disputed Term</u>	<u>Plaintiff’s Proposal</u>	<u>Defendants’ Proposal</u>	<u>Court’s Construction</u>
“random access signal” '908 Patent: Claims 1, 2, 4, & 6–9	Plain and ordinary meaning. No construction necessary.	“direct sequence spread spectrum signal”	“a direct sequence spread spectrum signal used as a random access signal”

1. Analysis

The term “random access signal” appears in Claims 1, 2, 4, and 6–9 of the '908 Patent. The Court finds that the term is used consistently in the claims and is intended to have the same general meaning in each claim. The parties dispute whether the term “random access signal” should be limited to a DSSS signal. The Court finds that the term “random access signal” should be construed to mean “a direct sequence spread spectrum signal used as a random access signal.”

As discussed above for the term “control channel,” the fundamental aspect of the invention is the concept of overlaying or overlapping a Multi-Carrier (MC) signal with a Direct Sequence Spread Spectrum (DSSS) signal in both the time and frequency domains. Figure 6 illustrates an example of this in the frequency domain:



'908 Patent at Figure 6. The specification describes the advantages and disadvantages of each system (i.e., a DSSS and a MC system). It states that an advantage of a DSSS system is that it is “inherently capable of supporting multi-cell and multi-user access applications through the use of orthogonal spreading codes,” and that “[t]he initial access of the physical channel and frequency planning are relatively easier because of interference averaging.” '908 Patent at 1:35–37.

The specification states that a disadvantage of a DSSS system is that it “may suffer severely from the loss of orthogonality in a broadband environment due to multi-path propagation effects, which results in low

spectral efficiency.” ’908 Patent at 1:38–42. The specification further states that an advantage of an MC system is that it is “capable of supporting broadband applications with higher spectral efficiency ... by using cyclic prefixes to extend the signal period as the data is multiplexed on orthogonal sub-carriers.”’908 Patent at 1:45–51. It then states that a disadvantage of an MC system is that it is “vulnerable while operating in multi-user and multi-cell environments.” ’908 Patent at 1:56–58.

With this background, the specification discloses the invention as “a broadband wireless communication system where both the MC and DSSS signals are intentionally overlaid together in both time and frequency domains” to take advantage of both techniques by “mitigat[ing] their weaknesses.” ’908 Patent at 2:42–47. Specifically, “[t]he MC signal is used to carry broadband data signal for its high spectral efficiency, while the DSSS signal is used for special purpose processing, such as initial random access, channel probing, and short messaging, in which signal properties such as simplicity, self-synchronization, and performance under severe interference are of concern.” ’908 Patent at 2:47–53.

Regarding the disputed term, the intrinsic evidence indicates that the “random access signal” is “a direct sequence spread spectrum signal

used as a random access signal.” Indeed, the specification only describes the random access signal as a direct sequence spread spectrum signal. In the section titled “Initial Random Access Using the Overlay Scheme,” the specification states that “FIG. 10 illustrates a DSSS signal used as initial random access by the mobile station MS_j 1004, in an overlay system.” ’908 Patent at 8:34–35. Similarly, the specification states that the mobile station “sends an initial *random access signal over the DSSS channel* with a certain signature code or sequence.” ’908 Patent at 8:52–53 (emphasis added). In other words, the “random access signal” is “a direct sequence spread spectrum signal used as a random access signal.” ’908 Patent at 8:34–35.

The specification further explains the signal properties that make a DSSS signal particularly appropriate for the random access function: “the DSSS signal is used for special purpose processing, such as initial random access, channel probing, and short messaging, in which signal properties such as simplicity, self synchronization, and performance under severe interference are of concern” ’908 Patent at 2:49–53. Thus, the Court finds that the claims should not be read so broadly to include systems that do not include using a DSSS signal as a random access signal. *See, e.g.,*

SciMed Life Sys., Inc. v. Advanced Cardiovascular Sys., Inc., 242 F.3d 1337, 1344 (Fed. Cir. 2001) (“The words ‘all embodiments of the present invention’ are broad and unequivocal. It is difficult to imagine how the patents could have been clearer in making the point that the coaxial lumen configuration was a necessary element of every variant of the claimed invention.”).

Furthermore, the examiner initially rejected the claims because the specification did not teach “the claimed particulars of the initial random access signal, like its own time duration,” ECF 131-14, PageID.9797 (Aug. 31, 2020 Rejection). The patentees responded that “[t]his feature is illustrated at least in FIG. 5 and described in paragraphs [0034]-[0035] and [0063] of the present Application.” ECF 131-14, PageID.9801–02 (Sept. 11, 2020 Remarks). Figure 5 and the cited paragraphs do not mention a “random access signal,” instead they only mention DSSS. ECF 131-14, PageID.9776–77, 9783 (June 16, 2020 Application at ¶¶ 34–35, 63, Fig. 5).

Further, the specification requires a DSSS signal in all embodiments. For example, the specification explains that “the embodiments of this invention” (not just some embodiments), “overlay the

MC signal, ... and the DSSS signal.” ’908 Patent at 2:61–63. After disclosing the idea of overlaying MC signals with DSSS signals, the specification explains that “[t]his invention further provides apparatus and means to implement the mentioned processes and methods [(i.e., the overlaying of MC signals with DSSS signals)] in a broadband wireless multi-access and/or multi-cell network, using advanced techniques such as transmit power control, spreading signal design, and iterative cancellation.” ’908 Patent 3:4–8. These statements clearly delineate the scope of the claims.

Indeed, the specification consistently describes the overlaying of MC signals with DSSS signals. *See e.g.*, ’908 Patent at 4:16–24, 4:41–5:1, 6:1–37, 7:1–3, 7:8–10, 7:45–56, 7:66–8:7, 8:15–20. The specification does not disclose overlaying any other type of signal with MC signals. Instead, the specification distinguishes the disclosed invention from conventional systems that do not overlay MC signals with DSSS signals. ’908 Patent at 2:58–64 (“Unlike a typical CDMA system ... or an OFDM system... the embodiments of this invention overlay the MC signal ... and the DSSS signal.”).

Plaintiff argues that the surrounding claim language clearly

confirms that “random access signal” should not be limited to a “direct sequence spread spectrum signal.” ECF 127, PageID.9020–22. Plaintiff also argues that Claim 8 expressly adds the limitation that the random access signal is a spread spectrum signal. ECF 127, PageID.9020. Plaintiff contends that this means that the term “random access signal” is presumed to not be limited to spread spectrum signals, much less a particular type of spread spectrum signal. ECF 127, PageID.9020–21. According to Plaintiff, adopting Defendants’ construction would make Claim 8 superfluous. ECF 127, PageID.9021. Plaintiff further argues that the specification’s description of the random access as a DSSS signal is only one embodiment that is not intended to limit the claimed invention. ECF 127, PageID.9021 (citing ’980 Patent at 8:37–38).

The Court disagrees and is cognizant that to impose a limited construction, it is “not enough that the only embodiments, or all of the embodiments, contain a particular limitation.” *Thorner*, 669 F.3d at 1366. Indeed, this is an instance where “the distinction between using the specification to interpret the meaning of a claim and importing limitations from the specification into the claim can be a difficult one to apply in practice.” *Phillips*, 415 F.3d at 1323. However, the Court is ultimately

persuaded by the fact that the '908 Patent discloses the invention as “a broadband wireless communication system where both the MC and DSSS signals are intentionally overlaid together in both time and frequency domains” to take advantage of both techniques by “mitigat[ing] their weaknesses.” '908 Patent at 2:42–47.

Likewise, Plaintiff's claim differentiation fails, because claim differentiation only creates a presumption that is “overcome by a contrary construction dictated by the written description or prosecution history.” *Retractable Techs., Inc. v. Becton*, 653 F.3d 1296, 1305 (Fed. Cir. 2011) (citing *Seachange Int'l, Inc. v. C-COR, Inc.*, 413 F.3d 1361, 1369 (Fed. Cir. 2005)). Here, the weight of the remaining intrinsic evidence overcomes the claim differentiation presumption.

This is not a case “where the references to a certain limitation as being the ‘invention’ are not uniform, or where other portions of the intrinsic evidence do not support applying the limitation to the entire patent.” *Absolute Software, Inc. v. Stealth Signal, Inc.*, 659 F.3d 1121, 1136 (Fed. Cir. 2011). Instead, the intrinsic evidence uniformly indicates that the “random access signal” is a “direct sequence spread spectrum signal.” The Court is unconvinced that other portions of the intrinsic

evidence preclude applying the limitation to the entire patent.

2. Court's Construction

For the reasons set forth above, the Court construes the term **“random access signal”** to mean **“a direct sequence spread spectrum signal used as a random access signal.”**

F. “time-frequency resource unit”

<u>Disputed Term</u>	<u>Plaintiff's Proposal</u>	<u>Defendants' Proposal</u>	<u>Court's Construction</u>
“time-frequency resource unit” '450 Patent: Claims 7 & 11	Plain and ordinary meaning. No construction necessary.	“a combination of time and frequency units designed according to the application requirements of the application that is being grouped”	Plain and ordinary meaning.

1. Analysis

The term “time-frequency resource unit” appears in Claims 7 and 11 of the '450 Patent. The Court finds that the term is used consistently in the claims and is intended to have the same general meaning in each claim. The parties dispute whether Plaintiff defined the term “time-frequency resource unit” in response to Dell's IPR petition.

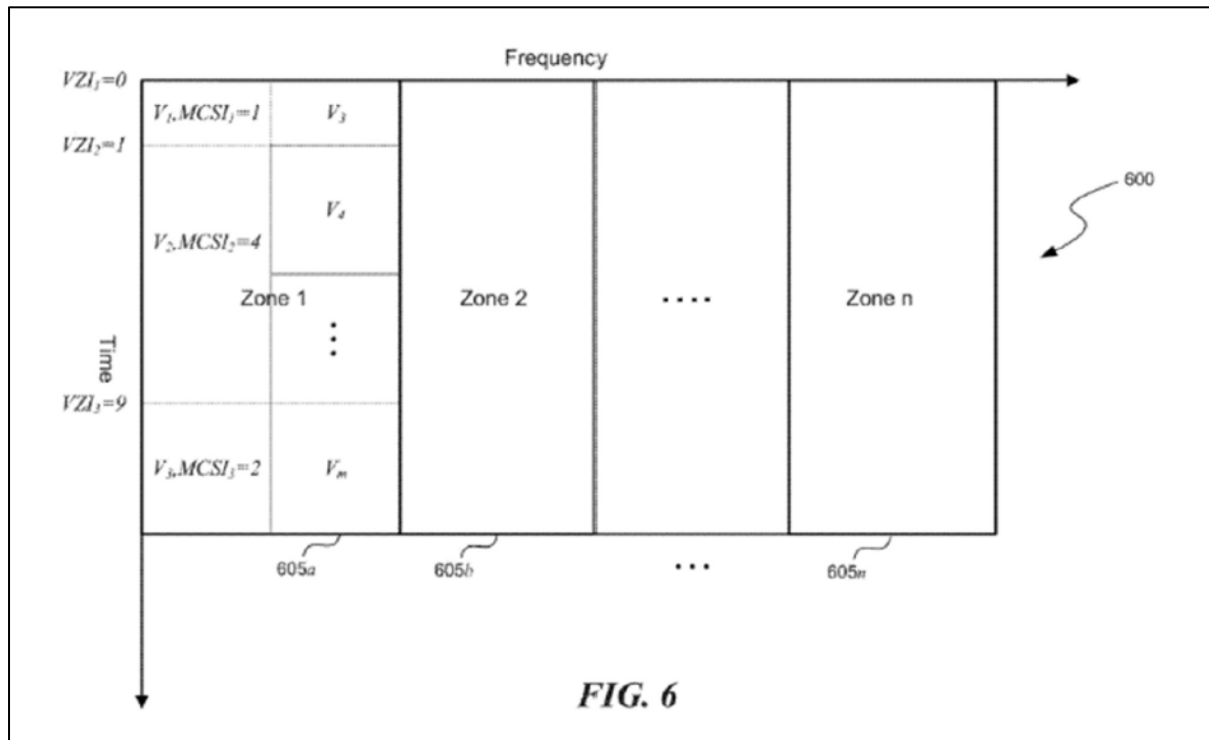
The specification teaches using a “basic resource unit” or “time-frequency resource unit” to reduce the overhead required to transmit and

recover data in a multi-carrier packet communication system.³ '450 Patent at 2:14–16. The specification states that this was needed “to improve the spectral efficiency of the system,” because prior art systems could use more than 30% of the overall data communication for control overhead (*i.e.*, data required to allocate resources). *See, e.g.*, '450 Patent at 2:10–13 (“The overhead of the MAP message alone can therefore account for as much as 32.5% of the overall data communication, thereby resulting in a relatively low spectral efficiency.”).

Here, the parties’ dispute relates to the arguments made by Plaintiff in *Dell Inc. v. Neo Wireless LLC*, IPR2021-01486 (PTAB filed Sept. 16, 2021) (“Dell IPR”). During the Dell IPR, Plaintiff argued that “[i]nstead of spreading the various applications carried in packet streams throughout the available resource region, per the IEEE 802.16 standard, the inventors took a different approach: they ‘group[ed] like applications together.’” ECF 131-15, PageID.9816–17 (citing '450 Patent at 5:43–53). Plaintiff contended that Figure 6 “illustrates this innovative grouping approach.” ECF 131-15, PageID.9817; *see also* ECF 127, PageID.9023

³ The intrinsic evidence indicates that the patentees used the terms “time-frequency resource unit” and “basic resource unit” interchangeably.

(“This reduction in overhead was made possible by grouping packet streams, according to certain shared parameters, into regularly shaped time-frequency units.”).



'450 Patent at Figure 6. Plaintiff argued that “Zone 1 in Figure 6 is ‘further subdivided into time-frequency [resource] segments,’ V_1 , V_2 , V_3 , V_4 , ..., V_m , each representing a packet stream associated with an application for Zone 1.” ECF 131-15, PageID.9818 (citing '450 Patent at 6:3–6, 6:10–11, 6:22–23). Plaintiff contended that “[e]ach time-frequency resource segment can be expressed in terms of a number (N) of ‘basic resource unit[s],’ each having a fixed number of symbols and subcarriers

ECF 131-15, PageID.9818 (citing '450 Patent at 6:9–10, 6:49–50). Plaintiff noted that in the exemplary embodiment, a basic resource unit has 80 raw symbols in a certain number of subcarriers. ECF 131-15, PageID.9818 (citing '450 Patent at 6:9–10, Table 1).

Specifically, Plaintiff referred to Table 1 from the '450 Patent, and argued that it “provides a value (an ‘MCS index’ or MCSI) that indicates how many basic resource units (‘Units’) are in any given time-frequency resource segment as used in a VOIP application.”

MCSI	Modulation	Coding rate	Information bits	Raw symbols	Units
1	16QAM	$\frac{1}{2}$	160	80	1
2	QPSK	$\frac{1}{2}$	160	160	2
3	QPSK	$\frac{1}{4}$	160	320	4
4	QPSK	$\frac{1}{8}$	160	640	8

ECF 131-15, PageID.9818–19. Plaintiff further argued the following:

FIG. 6, above, shows, for example, that time-frequency resource segment V_1 has an MCS index $MCSI_1$ of 1. If one follows MCSI over to Units in TABLE 1, one sees that this corresponds with one basic resource unit. As for time-frequency resource segment V_2 , it has an MCS index $MCSI_2$ of 4. That corresponds with eight basic resource units, as shown.

ECF 131-15, PageID.9819 (internal citations omitted). Plaintiff then

argued that “[b]y effectively transforming the two independent dimensions of time and frequency into one time-frequency dimension measured by *a basic resource unit having a fixed number of symbols in a fixed number of subcarriers* that fits the resource requirements of a given application, the inventors achieved an advantageous reduction in the amount of data required to allocate resources.” ECF 131-15, PageID.9820 (citing ’450 Patent at 7:28–30) (emphasis added).

Plaintiff also contended that “[t]he inventors intentionally chose to forego the flexibility of *irregular resource allocation at the lowest granularity level* (requiring multidimensional allocation) to create, *instead, regularly shaped time-frequency resource units* allocated at the application granularity level, using a single dimension, to provide the control overhead reduction.” ECF 131-15, PageID.9821 (emphasis added). Accordingly, the Court finds that a POSITA would understand that “time-frequency resource unit” includes a regularly shaped unit having a fixed number of symbols and subcarriers. As discussed above, Figure 6 and Table 1 provide examples of “time-frequency resource units” that are regularly shaped, and have a fixed number of symbols and subcarriers.

The Court notes that Claims 7 recites that “each unit containing a

set of frequency subcarriers in a group of OFDM symbols, where $N=2, 4$, or 8 .” Thus, the claim language includes a fixed number of symbols and subcarriers, as argued in the Dell IPR. To the extent that a party argues that the “time-frequency resource units” do not need to be regularly shaped, the Court rejects that argument. With this understanding, the Court finds that the term should be given its plain and ordinary meaning.

Defendants (other than Volkswagen) argue that their construction is proper based on statements made by Plaintiff and its expert during the Dell IPR. Defendants contend that Plaintiff defined the term “time-frequency resource unit” to distinguish the prior art as follows:

A time-frequency resource unit is not an arbitrary combination of time and frequency units and is instead designed according to the application requirements of the application that is being grouped.

ECF 131, PageID.9115 (citing ECF 131-15, PageID.9821). Defendants argue that this is a clear and unmistakable disclaimer that precludes Plaintiff from arguing any other type of time-frequency resource unit infringes. ECF 131, PageID.9115. Defendants further argue that Plaintiff included a lengthy discussion of the relationship between the “time-frequency resource unit” and the “starting time frequency coordinate”

limitations,” which Plaintiff contended are “inextricably tied in the patent.” ECF 131, PageID.9115 (citing ECF 131-15, PageID.9816–22, 9830).

The Court disagrees that Plaintiff clearly and unmistakably defined the term “time-frequency resource unit” as Defendants propose. *3M Innovative Props. Co. v. Tredegar Corp.*, 725 F.3d 1315, 1322 (Fed. Cir. 2013) (“This court does not rely on the prosecution history to construe the meaning of the claim to be narrower than it would otherwise be unless a patentee limited or surrendered claim scope through a clear and unmistakable disavowal.”). Here, the main issue addressed by Plaintiff was how the time-frequency resource units transform “time and frequency to a single dimension.” ECF 131-15, PageID.9822.

For example, Plaintiff argued that “[b]y effectively transforming the two independent dimensions of time and frequency into one time-frequency dimension measured by a basic resource unit having a fixed number of symbols in a fixed number of subcarriers that fits the resource requirements of a given application, the inventors achieved an advantageous reduction in the amount of data required to allocate resources.” ECF 131-15, PageID.9820.

Plaintiff made this argument multiple times during the IPR. ECF 131-15, PageID.9832 (“[The prior art reference] does not show any unifying time-frequency resource unit that transforms the dimensions of time and frequency into one dimension of time-frequency to achieve the reduction in control overhead that is central to the invention.”); ECF 131-15, PageID.9835 (“The POSITA at the time of the claimed invention would have understood that [the prior art] does not teach time-frequency resource units for transforming the two independent dimensions of time and frequency into a single dimension of “time-frequency.”); ECF 131-15, PageID.9818 (“The inventors realized that, by grouping like applications, they could effectively transform two independent dimensions (time and frequency) into a single dimension (time-frequency) measured in basic resource units configured to fit the application resource requirements.”). These arguments indicate that the “time-frequency resource unit” cannot be an “irregular resource allocation,” but instead must be a regularly shaped unit having a fixed number of symbols and subcarriers, as discussed above. ECF 131-15, PageID.9816, 9821, 9835–36.

Defendants correctly argue that the IPR and the specification disclose embodiments where the packet streams are grouped according to

application type. *See, e.g.*, '450 Patent 5:24–8:35 (discussing Fig. 6); ECF 131-15, PageID.9821. However, time-frequency resource units are not limited to grouped applications, because other embodiments teach that the packet streams may also be grouped or classified “based on application type, quality of service (QoS) requirement, or other properties.” ECF 127-3, PageID.9070 (Alberth Decl. ¶ 41); '450 Patent 8:55–9:3 (discussing Fig. 7).

Accordingly, Defendants’ construction is improper because it would exclude embodiments where the time-frequency resource units are grouped in other ways besides application type. *See SciMed*, 242 F.3d at 1340; *Oatey Co. v. IPS Corp.*, 514 F.3d 1271, 1276 (Fed. Cir. 2008) (“We normally do not interpret claim terms in a way that excludes embodiments disclosed in the specification.”). The point is that the “time-frequency resource unit” must be a regularly shaped unit having a fixed number of symbols and subcarriers. Accordingly, the Court rejects Defendants’ construction.

2. Court’s Construction

For the reasons set forth above, the term **“time-frequency resource unit”** is given its **plain and ordinary meaning**.

G. “the antenna transmission scheme comprising a transmission diversity scheme or a multiple-input multiple-output (MIMO) scheme”

<u>Disputed Term</u>	<u>Plaintiff’s Proposal</u>	<u>Defendants’ Proposal</u>	<u>Court’s Construction</u>
“the antenna transmission scheme comprising a transmission diversity scheme or a multiple-input multiple-output (MIMO) scheme” ’941 Patent: Claims 8 & 13	“the antenna transmission scheme is capable of comprising either a MIMO scheme or a transmission diversity scheme other than MIMO. To avoid any doubt, this requires supporting both MIMO and non-MIMO transmission diversity systems”	“the mobile-station specific transmission parameters alternatively indicate an antenna transmission scheme that comprises a MIMO scheme or an antenna transmission scheme comprising a transmission diversity scheme other than MIMO, wherein the antenna transmission scheme is capable of comprising either a MIMO scheme or a transmission diversity scheme other than MIMO. To avoid any doubt, this requires supporting both MIMO and non-MIMO transmission diversity systems”	“the antenna transmission scheme is capable of comprising, as alternatives, either a MIMO scheme or a transmission diversity scheme other than MIMO. To avoid any doubt, this requires supporting both MIMO and non-MIMO transmission diversity systems”

1. Analysis

The phrase “the antenna transmission scheme comprising a transmission diversity scheme or a multiple-input multiple-output

(MIMO) scheme” appears in Claims 8 and 13 of the ’941 Patent. The Court finds that the phrase is used consistently in the claims and is intended to have the same general meaning in each claim. The disputed phrase is directed to antenna scheme options. The parties agree that the claims require the system to be able to support both MIMO schemes and transmission diversity schemes. ECF 127, PageID.9026. The parties dispute whether the claimed system is limited to only either a transmission diversity scheme or a MIMO scheme, excluding other possible antenna transmission schemes, such as single-antenna schemes SISO or SIMO. The intrinsic evidence indicates that the claims should not be limited as Defendants propose.

The specification states that one of the disclosed improvements in OFDM networks is the use of different antenna transmission schemes to adapt to different operating conditions of a mobile station in the system. For example, the specification states that “[s]ome multiple antenna techniques, such as transmission diversity, are used to improve the transmission robustness against fading channel effects, whereas other multiple antenna techniques *such as* multiple-input multiple-output (MIMO) schemes are used to improve transmission throughput in

favorable channel conditions.” ’941 Patent 6:60–65 (emphasis added). The phrase “such as” indicates that there could be other schemes that are neither transmission diversity nor MIMO.

Moreover, the claim term’s plain language explicitly states the antenna transmission scheme “compris[es]” a transmission diversity scheme or a MIMO scheme, without any indication that it is to be limited to only these two options. Defendants argue that it is “legal error” to interpret the term “comprising” used in a body of a claim as open-ended. ECF 131, PageID.9120. The Court disagrees because the specification states that “the words ‘comprise,’ ‘comprising,’ and the like are to be construed in an inclusive sense as opposed to an exclusive or exhaustive sense; that is to say, in the sense of ‘including, but not limited to.’” ’941 Patent at 2:65–3:1.

Defendants further argue that their construction is the same construction that Plaintiff agreed to in the 2021 Dell litigation. ECF 131, PageID.9119 (citing ECF 131-16). Defendants contend that the disjunctive “or” in the claim language necessitates a choice between two alternative possibilities. ECF 131, PageID.9119. Defendants also contend that it is impossible for a single-antenna scheme, like SISO or SIMO, to

transmit data using the claimed transmission schemes. ECF 131, PageID.9121.

The Court finds that Defendants' construction contradicts the above-discussed intrinsic evidence and would improperly limit the claims. Plaintiff states that it fully stands behind its agreed construction in the Dell case. ECF 127, PageID.9027. However, Plaintiff contends that the agreed construction was the bulky, imprecise product of lengthy negotiations to arrive at an agreement, and that Defendants are intentionally misinterpreting it in this case to their benefit. ECF 127, PageID.9027. According to Plaintiff, Defendants are misreading that language to introduce a new dispute not present in Dell, that is, whether the system disallows a possible third transmission scheme other than MIMO and transmission diversity. ECF 127, PageID.9027–28. The Court agrees with Plaintiff and rejects Defendants' arguments.

Finally, the Court permitted the parties to file supplemental briefing for this term. June 6, 2023 Text Order. The Court reviewed the supplemental briefing, and it did not appear to cite to any new statements made by Plaintiff since the claim construction briefing was originally filed in this case. ECF Nos. 150, 151, 154, 155. Instead, the briefing only cited

to statements made by the PTAB in its Decision Granting Institution of IPR. Although statements made by the PTAB are not binding on the Court, the Court considered the PTAB statements cited by the parties in their supplemental briefing and gave them their proper weight.

2. Court's Construction

For the reasons set forth above, the Court construes the phrase **“the antenna transmission scheme comprising a transmission diversity scheme or a multiple-input multiple-output (MIMO) scheme”** to mean **“the antenna transmission scheme is capable of comprising, as alternatives, either a MIMO scheme or a transmission diversity scheme other than MIMO. To avoid any doubt, this requires supporting both MIMO and non-MIMO transmission diversity systems.”**

H. “the mobile station-specific transmission parameters indicate ... a corresponding subchannel configuration ... the corresponding subchannel configuration characterized by distributed subcarriers or localized subcarriers in the frequency domain”

<u>Disputed Term</u>	<u>Plaintiff's Proposal</u>	<u>Defendants' Proposal</u>	<u>Court's Construction</u>
<p>“the mobile station-specific transmission parameters indicate ... a corresponding subchannel configuration ... the corresponding subchannel configuration characterized by distributed subcarriers or localized subcarriers in the frequency domain”</p> <p>'941 Patent: Claims 8 & 13</p>	<p>“the mobile station-specific transmission parameters indicate ... a corresponding subchannel configuration . . the corresponding subchannel configuration characterized by distributed subcarriers or localized subcarriers in the frequency domain, wherein the subchannel configuration is capable of comprising either localized or distributed subcarriers. To avoid any doubt, this requires supporting both localized and distributed subchannel configurations.”</p>	<p>“the mobile station-specific transmission parameter alternatively indicates either distributed subcarriers or localized subcarriers in the frequency domain as subchannel configurations”</p>	<p>“at a minimum, the mobile station-specific transmission parameters are capable of indicating, as alternatives, both distributed subcarriers and localized subcarriers in the frequency domain as subchannel configurations”</p>

1. Analysis

The phrase “the mobile station-specific transmission parameters indicate ... a corresponding subchannel configuration ... the corresponding subchannel configuration characterized by distributed subcarriers or localized subcarriers in the frequency domain” appears in Claims 8 and 13 of the ’941 Patent. The Court finds that the phrase is used consistently in the claims and is intended to have the same general meaning in each claim. The parties agree that the claims require the system to be able to support both localized and distributed subchannel configurations. ECF 127, PageID.9029. The parties dispute whether the phrase requires a separate indicator flag for indicating distributed subcarriers or localized subcarriers, as Defendants propose.

A week before filing its claim construction brief, Plaintiff filed its Patent Owner Preliminary Responses (“POPR”) in VW’s IPR proceeding in which it argued for the PTAB’s construction from the Dell IPR. Specifically, Plaintiff argued that “the correct construction requires, at a minimum, that the mobile station-specific transmission parameters are capable of indicating, as alternatives, both distributed subcarriers and localized subcarriers in the frequency domain as subchannel

configurations.” ECF 131-20, PageID.9981. Plaintiff further argued that “[t]his construction also is supported by both the ’941 patent’s specification and the prosecution history.” ECF 131-20, PageID.9981–82.

Plaintiff also contended that “this construction is also consistent with the positions of both Patent Owner and the joint defendants, including Petitioner, in the concurrent District Court litigation.” ECF 131-20, PageID.9982–83. Plaintiff concluded by stating that “it is indisputable that these claims require that the mobile station-specific parameters must be capable of indicating, at least, both a distributed and localized subcarrier configuration.” ECF 131-20; PageID.9983.

Plaintiff further conceded that the construction was “a binding disclaimer that applies to the scope of these claims in this ‘later proceeding.’” ECF 131-20, PageID.9982 (citing *CUPP Computing AS v. Trend Micro Inc.*, 53 F.4th 1376, 1383 (Fed. Cir. 2022)). Accordingly, the Court adopts the construction Plaintiff argued was binding in its IPR Response. Failing to adopt the PTAB’s construction would allow Plaintiff to have it both ways.

Plaintiff contends that Defendants’ construction omits that the subchannel configuration is “characterized by” localized or distributed

subcarriers. ECF 127, PageID.9029. The Court notes that the “characterized by” language was also omitted from the construction that Plaintiff argued was correct in its IPR response. ECF 131-20, PageID.9981–83. Accordingly, the Court rejects Plaintiff’s argument.

Plaintiff further argues that it assumes that “the purpose behind Defendants’ proposal is to import an arbitrary limitation that the subchannel configuration must take the form of an indicator flag, which, for example, has a value of 0 for distributed subcarriers and has a value of 1 for localized subcarriers.” ECF 127, PageID.9030. Defendants argue that the PTAB considered and expressly rejected Plaintiff’s argument based on the claim term “characterized” to avoid a separate parameter that indicates these two alternatives. ECF 131, PageID.9123 (citing 131-18 (IPR2021-01468)). The Court agrees with Defendants.

First, Plaintiff’s argument is inconsistent with the language of Claims 8 and 13. ECF 131-18, PageID.9901. The claims explicitly recite receiving a control message that includes “transmission parameters” that “indicate ... a corresponding subchannel configuration ... characterized by distributed subcarriers or localized subcarriers in the frequency domain.” Thus, the claim language requires some affirmative indication, i.e., a

mobile station specific transmission parameter, that would at least “indicate ... a corresponding subchannel configuration characterized by distributed subcarriers or localized subcarriers in the frequency domain” for a subsequent transmission from a base station to a mobile station.

Moreover, Plaintiff’s argument is also inconsistent with the file history. To overcome the PTO’s rejection, the patentees argued that their “system transmits subchannel configuration information, including whether the subchannels are ‘distributed subcarriers or localized subcarriers in the frequency domain.’” ECF 131-19, PageID.9943 (Apr. 12, 2018 Resp. to Off. Action).

The PTAB in the IPR stated that the examiner apparently found this argument persuasive and found that “the claims were amended ‘to *indicate* that applicant’s system transmits subchannel configuration information, including *whether* the subchannels are ‘distributed subcarriers or localized subcarriers in the frequency domain.’” ECF 131-18, PageID.9902 (IPR2021-01468) (emphasis in original). Accordingly, to the extent that Plaintiff argues that the claims do not require a system that transmits subchannel configuration information, including whether the subchannels are “distributed subcarriers or localized subcarriers in

the frequency domain,” the Court rejects that argument.

2. Court’s Construction

For the reasons set forth above, the Court construes the phrase “**the mobile station-specific transmission parameters indicate ... a corresponding subchannel configuration ... the corresponding subchannel configuration characterized by distributed subcarriers or localized subcarriers in the frequency domain**” to mean “**at a minimum, the mobile station-specific transmission parameters are capable of indicating, as alternatives, both distributed subcarriers and localized subcarriers in the frequency domain as subchannel configurations.**”

I. “probing signal”

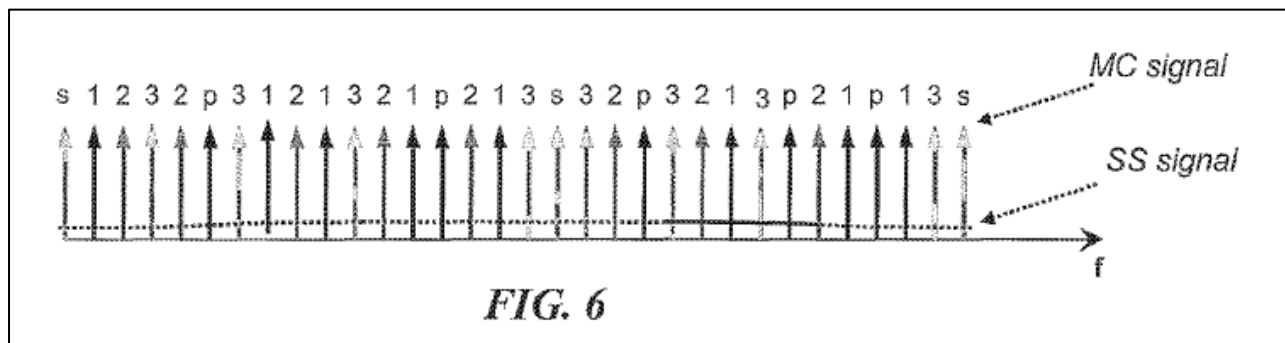
<u>Disputed Term</u>	<u>Plaintiff’s Proposal</u>	<u>Defendants’ Proposal</u>	<u>Court’s Construction</u>
“probing signal” '302 Patent: Claims 23, 24, 26, & 28	Plain and ordinary meaning. No construction necessary.	“direct sequence spread spectrum signal”	“a direct sequence spread spectrum signal used as a probing signal”

1. Analysis

The term “probing signal” appears in Claims 23, 24, 26, and 28 of

the '302 Patent. The Court finds that the term is used consistently in the claims and is intended to have the same general meaning in each claim. The parties dispute whether the term “probing signal” should be limited to a DSSS signal. The dispute parallels the dispute for the term “random access signal.”

As discussed above for the term “random access signal,” the fundamental aspect of the invention is the concept of overlaying or overlapping a Multi-Carrier (MC) signal with a Direct Sequence Spread Spectrum (DSSS) signal in both the time and frequency domains. Figure 6 illustrates an example of this in the frequency domain:



'302 Patent at Figure 6. The specification describes the advantages and disadvantages of each system (i.e., a DSSS and an MC system). It states that an advantage of a DSSS system is that it is “inherently capable of supporting multi-cell and multi-user access applications through the use of orthogonal spreading codes,” and that “[t]he initial access of the

physical channel and frequency planning are relatively easier because of interference averaging.” ’302 Patent at 1:28–33.

The specification states that a disadvantage of a DSSS system is that it “may suffer severely from the loss of orthogonally in a broadband environment due to multi-path propagation effects, which results in low spectral efficiency.” ’302 Patent at 1:34–38. The specification further states that an advantage of an MC system is that it is “capable of supporting broadband applications with higher spectral efficiency ... by using cyclic prefixes to extend the signal period as the data is multiplexed on orthogonal sub-carriers.”’302 Patent at 1:43–47. It then states that a disadvantage of an MC system is that it is “vulnerable while operating in multi-user and multi-cell environments.” ’302 Patent at 1:52–54.

With this background, the specification discloses the invention as “a broadband wireless communication system where both the MC and DSSS signals are intentionally overlaid together in both time and frequency domains” to take advantage of both techniques by “mitigat[ing] their weaknesses.” ’302 Patent at 2:39–44. Specifically, “[t]he MC signal is used to carry broadband data signal for its high spectral efficiency, while the DSSS signal is used for special purpose processing, such as initial random

access, channel probing, and short messaging, in which signal properties such as simplicity, self-synchronization, and performance under severe interference are of concern.” ’302 Patent at 2:44–50.

Regarding the disputed term, the intrinsic evidence indicates that the “probing signal” is “a direct sequence spread spectrum signal used as a probing signal.” Indeed, the specification only describes the probing signal as a direct sequence spread spectrum signal. ’302 Patent at 9:45 (“probing DSSS signal”), 9:7–8 (“DSSS signal is used for channel probing”), 9:36–37 (“send the DSSS signal for channel probing”), 9:50–51 (“channel probing with the DSSS signaling”). In the section titled “Channel Probing Using DSSS in the Overlay System,” the specification states that “FIG. 17 illustrates examples of communications between a base station 1702 and multiple mobile stations 1704 transmitting both DSSS and MC signals,” and that the “DSSS signal is used for channel probing or to carry short messages.” ’302 Patent at 8:65–9:8.

The specification similarly states that “the mobile station MS_j 1704 is transmitting its DSSS signal simultaneously with its own MC signal.” ’302 Patent at 9:12–13. This repeated and consistent use of a probing DSSS signal shows it is not merely a preferred embodiment, but rather a

requirement. In other words, the “probing signal” is “a direct sequence spread spectrum signal used as a probing signal.” ’302 Patent at 9:7–8.

The specification further explains the signal properties that make a DSSS signal particularly appropriate for the probing signal. Specifically, the specification states that “the DSSS signal is used for special purpose processing, such as initial random access, channel probing, and short messaging, in which signal properties such as simplicity, self synchronization, and performance under severe interference are of concern” ’302 Patent at 2:46–50. Thus, the Court finds that the claims should not be read so broadly to include systems that do not include using a DSSS signal as a probing signal. *See, e.g., SciMed Life Sys.*, 242 F.3d at 1344 (“The words ‘all embodiments of the present invention’ are broad and unequivocal. It is difficult to imagine how the patents could have been clearer in making the point that the coaxial lumen configuration was a necessary element of every variant of the claimed invention.”).

Furthermore, the patentees directly connected DSSS signal to a probing signal to distinguish prior art during prosecution. In trying to overcome a prior art rejection, the patentees pointed to the section titled “DSSS Signal Design,” and argued that “DSSS” is used as a probing signal

by putting “probing” in parentheses after “DSSS.” ECF 131-21, PageID.10030 (Nov. 7, 2019 Resp. to Off. Action).

Further, the specification requires a DSSS signal in all embodiments. For example, the specification explains that “the embodiments of this invention” (not just some embodiments), “overlay the MC signal, ... and the DSSS signal.” ’302 Patent at 2:58–60. After disclosing the idea of overlaying MC signals with DSSS signals, the specification explains that “[t]his invention further provides apparatus and means to implement the mentioned processes and methods [(i.e., the overlaying of MC signals with DSSS signals)] in a broadband wireless multi-access and/or multi-cell network, using advanced techniques such as transmit power control, spreading signal design, and iterative cancellation.” ’302 Patent at 3:1–5. These statements clearly delineate the scope of the claims.

Indeed, the specification consistently describes the overlaying of MC signals with DSSS signals. *See e.g.*, ’302 Patent at 4:6–14, 4:28–55, 5:55–6:20, 6:55–57, 6:59–61, 7:26–38, 7:48–56, 7:64–8:2. The specification does not disclose overlaying any other type of signal with MC signals. Instead, the specification distinguishes the disclosed invention from conventional

systems that do not overlay MC signals with DSSS signals. '302 Patent at 2:55–60 (“Unlike a typical CDMA system ... or an OFDM system... the embodiments of this invention overlay the MC signal ... and the DSSS signal.”).

Plaintiff argues that the specification does not limit the scope of the patentees' inventions to require using a direct sequence spread spectrum signal, but instead uses a DSSS as an embodiment to describe particular aspects of their inventions. ECF 127, PageID.9031 (citing '302 Patent 8:66–9:17; '908 Patent 8:34–55). Plaintiff contends that the probing signal used for channel probing is a distinct signal that is sent over a broad spectrum of frequency resources in order for the receiving base station to estimate the channel conditions across most, if not all, of the frequency channel used for data communications. ECF 127, PageID.9031–32.

According to Plaintiff, that distinction does not require that the claimed probing signal must be a DSSS. ECF 127, PageID.9032. Plaintiff argues that the probing signal could take the form of other, non-DSSS signals that are carried across multiple OFDM subcarriers. ECF 127, PageID.9032. Plaintiff contends that a probing signal can provide channel information to the base station on frequencies that are later used for data

signals. ECF 127, PageID.9032. For the reasons discussed above, the Court disagrees.

In summary, the Court is cognizant that to impose a limited construction, it is “not enough that the only embodiments, or all of the embodiments, contain a particular limitation.” *Thorner*, 669 F.3d at 1366 (Fed. Cir. 2012). Indeed, this is an instance where “the distinction between using the specification to interpret the meaning of a claim and importing limitations from the specification into the claim can be a difficult one to apply in practice.” *Phillips*, 415 F.3d at 1323. However, the Court is ultimately persuaded by the fact that the ’302 Patent discloses the invention as “a broadband wireless communication system where both the MC and DSSS signals are intentionally overlaid together in both time and frequency domains” to take advantage of both techniques by “mitigat[ing] their weaknesses.” ’302 Patent at 2:39–44.

This is not a case “where the references to a certain limitation as being the ‘invention’ are not uniform, or where other portions of the intrinsic evidence do not support applying the limitation to the entire patent.” *Absolute Software*, 659 F.3d at 1136. Instead, the intrinsic evidence uniformly indicates that the “probing signal” is “a direct

sequence spread spectrum signal used as a probing signal.” The Court is unconvinced that other portions of the intrinsic evidence preclude applying the limitation to the entire patent.

2. Court’s Construction

For the reasons set forth above, the Court construes the term **“probing signal”** to mean **“a direct sequence spread spectrum signal used as a probing signal.”**

J. “the probing signal is configured to occupy a portion of spectrum in the uplink frequency band not designated for transmission of uplink control signals in the system” / “a receiver configured to receive a request for a probing signal from a base station in the system” / “the probing signal is configured to overlap, in the time domain, with uplink signals transmitted over an uplink frequency band by other mobile devices in the system”

<u>Disputed Term</u>	<u>Plaintiff's Proposal</u>	<u>Defendants' Proposal</u>	<u>Court's Construction</u>
<p>“the probing signal is configured to occupy a portion of spectrum in the uplink frequency band not designated for transmission of uplink control signals in the system”</p> <p>'302 Patent, Claim 23</p>	<p>Plain and ordinary meaning. No construction necessary.</p>	<p>“the probing signal is configured to occupy a portion of spectrum in the uplink frequency band not designated for transmission of uplink control signals in the Orthogonal Frequency Division Multiplexing (OFDM) communication system”</p>	<p>Plain and ordinary meaning.</p>
<p>“a receiver configured to receive a request for a probing signal from a base station in the system”</p> <p>'302 Patent: Claim 23</p>	<p>Plain and ordinary meaning. No construction necessary.</p>	<p>“a receiver configured to receive a request for a probing signal from a base station in the Orthogonal Frequency Division Multiplexing (OFDM) communication system”</p>	<p>Plain and ordinary meaning.</p>

<p>“the probing signal is configured to overlap, in the time domain, with uplink signals transmitted over an uplink frequency band by other mobile devices in the system”</p> <p>’302 Patent: Claim 23</p>	<p>Plain and ordinary meaning. No construction necessary.</p>	<p>“the probing signal is configured to overlap, in the time domain, with uplink signals transmitted over an uplink frequency band by other mobile devices in the Orthogonal Frequency Division Multiplexing (OFDM) communication system”</p>	<p>Plain and ordinary meaning.</p>
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1. Analysis

The phrase “the probing signal is configured to occupy a portion of spectrum in the uplink frequency band not designated for transmission of uplink control signals in the system” appears in Claim 23 of the ’302 Patent. The phrase “a receiver configured to receive a request for a probing signal from a base station in the system” appears in Claim 23 of the ’302 Patent. The phrase “the probing signal is configured to overlap, in the time domain, with uplink signals transmitted over an uplink frequency band by other mobile devices in the system” appears in Claim 23 of the ’302 Patent.

The parties agree that the preamble of Claim 23 is limiting. The

parties further agree that the term “an Orthogonal Frequency Division Multiplexing (OFDM) communication system” recited in the preamble, provides antecedent basis for the term “the system,” recited in the body of the claims. The parties dispute whether the term “the system” should be construed based on antecedent basis.

Defendants argue that their construction flows from a straightforward application of the antecedent basis rule to the claim term “the system.” ECF 131, PageID.9127. Defendants contend that their construction makes that clear for the jury and removes any possibility of confusion. ECF 131, PageID.9127. Defendants further contend that there can be no legitimate dispute that Defendants’ construction is correct. ECF 131, PageID.9127–28. The Court disagrees.

“When the parties present a fundamental dispute regarding the scope of a claim term, it is the court's duty to resolve it.” *See O2 Micro Int’l v. Beyond Innovation Tech.*, 521 F.3d 1351, 1362–63 (Fed. Cir. 2008). Here, the parties do not present a fundamental claim construction dispute. The parties agree that the preamble of Claim 23 is limiting. ECF 131, PageID.9127. The parties further agree that “the system” recited in claim 23 is the OFDM system recited in the preamble. ECF 127,

PageID.9034 (“Both parties agree that the claim 23 preamble is limiting and that ‘the system’ in this claim term refers to the “system” introduced in the preamble.”). Therefore, the parties have not presented a claim construction dispute that needs to be resolved by the Court. *See, e.g., United States Surgical Corp. v. Ethicon, Inc.*, 103 F.3d 1554, 1568 (Fed. Cir. 1997) (“Claim construction is a matter of resolution of disputed meanings and technical scope, to clarify and when necessary to explain what the patentee covered by the claims, for use in the determination of infringement. It is not an obligatory exercise in redundancy.”); *O2 Micro Int’l Ltd. v. Beyond Innovation Tech. Co.*, 521 F.3d 1351, 1362 (Fed. Cir. 2008) (“[D]istrict courts are not (and should not be) required to construe every limitation present in a patent’s asserted claims.”). Accordingly, the Court will give the phrases their plain and ordinary meaning.

2. Court’s Construction

For the reasons set forth above, the phrase **“the probing signal is configured to occupy a portion of spectrum in the uplink frequency band not designated for transmission of uplink control signals in the system,”** the phrase **“a receiver configured to receive a request for a probing signal from a base station in the system,”**

and the phrase “the probing signal is configured to overlap, in the time domain, with uplink signals transmitted over an uplink frequency band by other mobile devices in the system” are given their plain and ordinary meaning.

K. “wherein the first plurality of subcarriers and the second plurality of subcarriers are received in at least one of the time slots”

<u>Disputed Term</u>	<u>Plaintiff’s Proposal</u>	<u>Defendants’ Proposal</u>	<u>Court’s Construction</u>
“wherein the first plurality of subcarriers and the second plurality of subcarriers are received in at least one of the time slots” '512 Patent: Claims 15 & 23	“wherein the first plurality of subcarriers and the second plurality of subcarriers are received in at least one of the same time slots”	Plain and ordinary meaning.	Plain and ordinary meaning.

1. Analysis

The phrase “wherein the first plurality of subcarriers and the second plurality of subcarriers are received in at least one of the time slots” appears in Claims 15 and 23 of the '512 Patent. The Court finds that the phrase is used consistently in the claims and is intended to have the same general meaning in each claim. The parties dispute whether the term “at

least one of the time slots” should be construed to mean “at least one of the *same* time slots,” as Plaintiff proposes.

The specification describes the use of two different types of pilot signals sent on respective pluralities of subcarriers that can be used by the receiving mobile station to evaluate the wireless channel conditions. ’512 Patent at 3:4–16. Claim 15 recites that an antenna and receiver are configured to receive “first pilots of a first type on a first plurality of subcarriers,” and “second pilots of a second type.” Claim 15 further recites that the “first plurality of subcarriers and the second plurality of subcarriers are received in at least one of the time slots.” Plaintiff argues that the term “at least one of the time slots” should be construed to mean “at least one of the *same* time slots.”

In support of its construction, Plaintiff argues that Figure 5 shows simultaneous transmission of common pilots (c) and cell-specific pilots (s). ECF 127, PageID.9036 (citing ’512 Patent 5:34–38). Plaintiff contends that a construction is necessary because the plain reading of the claim “would render the claim term superfluous.” ECF 127, PageID.9037. The Court disagrees.

By using the term “at least one time slot,” the claims specify that

the two groups of subcarriers can either be received in the same time slot or in different time slots. The claim language permits, for example, the first and second plurality of subcarriers to be received in “two” (which is “at least one”) time slots. *See Phillips v. AWH Corp.*, 415 F.3d 1303, 1314 (Fed. Cir. 2005) (en banc) (“[T]he claims themselves provide substantial guidance as to the meaning of particular claim terms.”). Thus, the term is not superfluous as Plaintiff contends.

In contrast, Plaintiff’s construction improperly narrows the claims to the same time slots. This effectively erases the “at least one” language by injecting the word “same” into the claims. The plain language of the claims does not require transmitting the subcarriers in the same time slot. Thus, Plaintiff’s construction would improperly redraft the claim language on the grounds that the actual language, which the patentees chose, is superfluous.

Furthermore, Plaintiff’s construction would render dependent Claim 19 superfluous. Claim 19 recites that “the first plurality of subcarriers are transmitted at *a same time* as the second plurality of subcarriers.” *Comark Comms., Inc. v. Harris Corp.*, 156 F.3d 1182, 1187 (Fed. Cir. 1998) (“To the extent that the absence of such a difference in

meaning and scope would make a claim superfluous, the doctrine of claim differentiation states the presumption that the difference between the claims is significant.”) (citing *Tandon Corp. v. United States Int’l Trade Comm’n*, 831 F.2d 1017, 1023 (Fed. Cir. 1987)). In summary, Plaintiff fails to provide a persuasive reason why Claims 15 and 23 should be narrowed as it proposes, when the plain language of the claims is broader.

Finally, the Court permitted the parties to file supplemental briefing for this term. June 6, 2023 Text Order. The Court reviewed the supplemental briefing, and it did not appear to cite to any new statements made by Plaintiff since the claim construction briefing was originally filed in this case. ECF Nos. 150, 151, 154, 155. Instead, the briefing only cited to statements made by the PTAB in its Decision Granting Institution of IPR. Although statements made by the PTAB are not binding on the Court, the Court considered the PTAB statements cited by the parties in their supplemental briefing and gave them their proper weight.

2. Court’s Construction

For the reasons set forth above, the phrase **“wherein the first plurality of subcarriers and the second plurality of subcarriers are received in at least one of the time slots”** is given its **plain and**

ordinary meaning.

L. “second pilots of a second type”

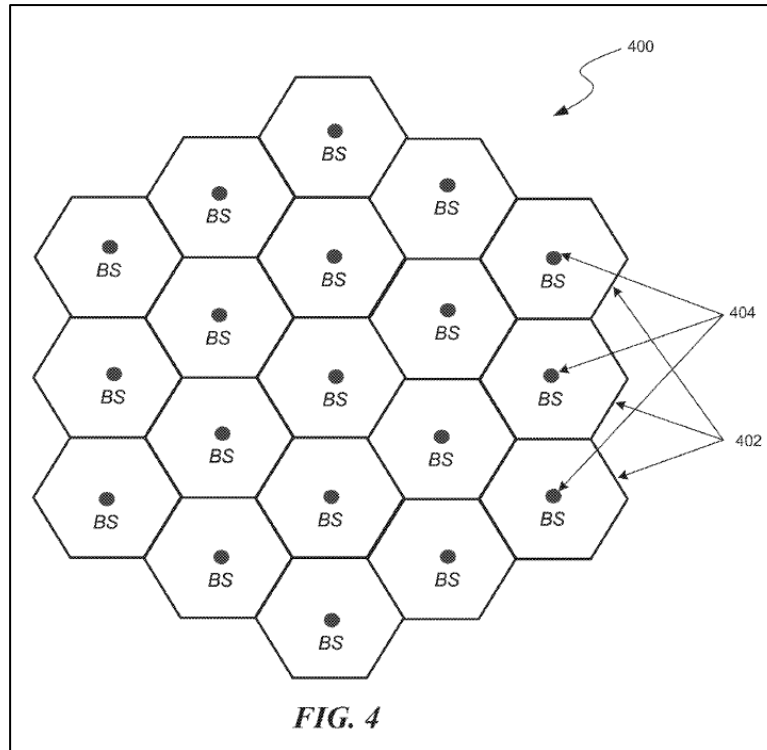
<u>Disputed Term</u>	<u>Plaintiff’s Proposal</u>	<u>Defendants’ Proposal</u>	<u>Court’s Construction</u>
“second pilots of a second type” '512 Patent: Claims 15 & 23	Plain and ordinary meaning. No construction necessary.	“pilots possessing a set of characteristics common to all base stations of the system”	“pilots possessing a set of characteristics common to at least two or more cells”

1. Analysis

The phrase “second pilots of a second type” appears in Claims 15 and 23 of the '512 Patent. The Court finds that the phrase is used consistently in the claims and is intended to have the same general meaning in each claim. The parties dispute whether the “second pilots of a second type” must be common pilots, as Defendants contend.

The specification indicates that the “second pilots of a second type” are “pilots possessing a set of characteristics common to at least two or more cells.” First, the title of the '512 Patent is “Method and Apparatus Using Cell-Specific and Common Pilot Subcarriers in Multi-Carrier, Multi Cell Wireless Communication Networks.” The specification further states that “[a] multi-carrier cellular wireless network (400) employs base stations (404) that transmit two different groups of pilot subcarriers: (1)

cell-specific pilot subcarriers, which are used by a receiver to extract information unique to each individual cell (402), and (2) common pilots subcarriers, which are designed to possess a set of characteristics common to all the base stations (404) of the system.”



’512 Patent at Abstract, Figure 4. The specification further describes the system and the two types of pilots as follows:

FIG. 1 depicts a basic multi-carrier wireless communication system consisting of a transmitter 102 and a receiver 104. A functional block 106 at the transmitter, called Pilot generation and insertion, generates pilot subcarriers and inserts them into predetermined frequency locations. These pilot subcarriers are used by the receiver to carry out certain functions. In aspects of this

invention, pilot subcarriers are divided into two different groups according to their functionalities, and hence their distinct requirements. The transmission format of each group of pilot subcarriers will be designed so that it optimizes the performance of the system functions such as frequency synchronization and channel estimation.

The first group is called “cell-specific pilot subcarriers,” and will be used by the receiver 104 to extract information unique to each individual cell. For example, these cell-specific pilot subcarriers can be used in channel estimation where it is necessary for a particular receiver to be able to differentiate the pilot subcarriers that are intended for its use from those of other cells. For these pilot subcarriers, counter-interference methods are necessary.

The second group is termed “common pilot subcarriers,” and are designed to possess a set of characteristics common to all base stations of the system. Thus, every receiver 104 within the system is able to exploit these common pilot subcarriers to perform necessary functions without interference problem. For instance, these common pilot subcarriers can be used in the frequency synchronization process, where it is not necessary to discriminate pilot subcarriers of different cells, but it is desirable for the receiver to combine coherently the energy of common pilot subcarriers with the same carrier index from different cells, so as to achieve relatively accurate frequency estimation.

’512 Patent at 3:4–36. Consistent with this disclosure, all of the

independent claims specify that the “first pilots of a first type” are “cell-specific pilots.” ’512 Patent at Claims 1, 8, 15 and 23 (all reciting “wherein the first pilots are cell-specific pilots”). Thus, the claimed “second pilots of a second type” is the disclosed common pilots. “[W]here the specification makes clear at various points that the claimed invention is narrower than the claim language might imply, it is entirely permissible and proper to limit the claims.” *Alloc*, 342 F.3d at 1370.

Although the specification indicates that the “second pilots of a second type” are the common pilots, it does not require the “common pilot” to possess “a set of characteristics common *to all base stations of the system*,” as Defendants propose. ’512 Patent at 1:51–53 (emphasis added). Instead, a “common pilot” only needs to possess “a set of characteristics common to at least two or more cells.” Specifically, the specification states that the common information may be “common to the entire network or *to a portion of the entire networks* such as a group of cells.” ’512 Patent at 1:51–53 (emphasis added).

Plaintiff argues that the claims are drafted such that the second pilots can be of a “different type” and data can be recovered “using channel estimates from at least the second pilots.” ECF 127, PageID.9038.

Plaintiff contends that a POSITA would recognize that the “second pilots” need not be common to all cells, but could include any additional type of pilots with “distinct requirements” that could be used conjointly with the “first pilots” to recover data. ECF 127, PageID.9038 (citing ECF 127-3, PageID.9073–74 (Alberth Decl. ¶ 52)). For the reasons discussed above, the Court disagrees.

In summary, the Court is cognizant that to impose a limited construction, it is “not enough that the only embodiments, or all of the embodiments, contain a particular limitation.” *Thorner*, 669 F.3d at 1366. Indeed, this is an instance where “the distinction between using the specification to interpret the meaning of a claim and importing limitations from the specification into the claim can be a difficult one to apply in practice.” *Phillips*, 415 F.3d at 1323. However, the Court is ultimately persuaded by the fact that the ’512 Patent discloses that the “second pilots of a second type” are “pilots possessing a set of characteristics common to at least two or more cells.”

This is not a case “where the references to a certain limitation as being the ‘invention’ are not uniform, or where other portions of the intrinsic evidence do not support applying the limitation to the entire

patent.” *Absolute Software, Inc. v. Stealth Signal, Inc.*, 659 F.3d 1121, 1136 (Fed. Cir. 2011). Instead, the intrinsic evidence uniformly indicates that the “second pilots of a second type” are “pilots possessing a set of characteristics common to at least two or more cells.” The Court is unconvinced that other portions of the intrinsic evidence preclude applying the limitation to the entire patent.

2. Court’s Construction

For the reasons set forth above, the Court construes the phrase **“second pilots of a second type”** to mean **“pilots possessing a set of characteristics common to at least two or more cells.”**

VI. CONCLUSION

The Court adopts the constructions above for the disputed terms of the Asserted Patents. Furthermore, the parties should ensure that all testimony that relates to the terms addressed in this Order is constrained by the Court’s reasoning. However, in the presence of the jury, the parties should not expressly or implicitly refer to each other’s claim construction positions and should not expressly refer to any portion of this Order that is not an actual construction adopted by the Court. The references to the claim construction process should be limited to informing the jury of the

constructions adopted by the Court. For ease of reference, the claim constructions are set forth in Appendix A.

It is SO ORDERED.

Date: November 20, 2023

/s/Terrence G. Berg
HON. TERRENCE G. BERG
United States District Judge

APPENDIX A

<u>Term/Phrase</u>	<u>Construction</u>
<p>“In a multi-cell orthogonal frequency division multiple access (OFDMA) wireless communication system comprising a plurality of base stations and mobile stations, a mobile station configured to communicate with a serving base station in a cell via a communication channel, the mobile station comprising:”</p> <p>’366 Patent: Claim 1</p>	<p>The preamble is limiting. Plain and ordinary meaning.</p>
<p>“In an orthogonal frequency division multiple access (OFDMA) wireless communication system, a method for signal transmission by a mobile station to a serving base station via a communication channel, the method comprising:”</p> <p>’366 Patent: Claim 17</p>	<p>The preamble is limiting. Plain and ordinary meaning.</p>
<p>“A mobile station comprising:”</p> <p>’908 Patent: Claim 1</p>	<p>The preamble is limiting. Plain and ordinary meaning.</p>

<p>“A mobile device in a wireless packet system using a frame structure of multiple frames for transmission, each frame comprising a plurality of time intervals, each time interval comprising a plurality of orthogonal frequency division multiplexing (OFDM) symbols, and each OFDM symbol containing a plurality of frequency subcarriers, the mobile device configured to:”</p> <p>’450 Patent: Claim 7</p>	<p>The preamble is limiting. Plain and ordinary meaning.</p>
<p>“A link adaption method by a mobile station served by a serving base station in an Orthogonal Frequency Division Multiplexing (OFDM) communication system, the communication system utilizing a transmission structure with time slots in the time domain and frequency subchannels in the frequency domain, the method comprising:”</p> <p>’941 Patent: Claim 8</p>	<p>The preamble is limiting. Plain and ordinary meaning.</p>

<p>“A mobile station served by a serving base station in an Orthogonal Frequency Division Multiplexing (OFDM) communication system, the communication system utilizing a transmission structure with time slots in the time domain and frequency subchannels in the frequency domain, the mobile station comprising a receiver configured to:”</p> <p>’941 Patent: Claim 13</p>	<p>The preamble is limiting. Plain and ordinary meaning.</p>
<p>“A mobile device in an Orthogonal Frequency Division Multiplexing (OFDM) communication system, the mobile device comprising”</p> <p>’302 Patent: Claim 23</p>	<p>The preamble is limiting. Plain and ordinary meaning.</p>
<p>“An orthogonal frequency division multiple access (OFDMA)-compatible mobile station that uses subcarriers in a frequency domain and time slots in a time domain, the OFDMA-compatible mobile station comprising:”</p> <p>’512 Patent: Claim 15</p>	<p>The preamble is limiting. Plain and ordinary meaning.</p>

<p>“A method performed by an orthogonal frequency division multiple access (OFDMA)-compatible mobile station that uses subcarriers in a frequency domain and time slots in a time domain, the method comprising:”</p> <p>’512 Patent: Claim 23</p>	<p>The preamble is limiting. Plain and ordinary meaning.</p>
<p>“time-frequency coordinate”</p> <p>’450 Patent: Claim 7</p>	<p>“one-dimensional time frequency coordinate”</p>
<p>“wherein modular coding is applied to the time-frequency resource units in the segment of time-frequency resource”</p> <p>’450 Patent: Claim 11</p>	<p>“wherein a modular coding scheme is applied to the time-frequency resource units in the segment of time-frequency resource”</p>
<p>“configured to”</p> <p>’366 Patent: Claims 1 & 5; ’908 Patent: Claims 1–3 & 9; ’450 Patent: Claim 7; ’941 Patent: Claims 13 & 14; ’302 Patent: Claim 23; ’512 Patent: Claim 15</p>	<p>“designed to”</p>
<p>“the ranging signal exhibits a low peak-to-average power ratio in the time domain”</p> <p>’366 Patent: Claims 1 & 17</p>	<p>Indefinite.</p>

<p>“a ranging sequence selected from a set of ranging sequences”</p> <p>’366 Patent: Claims 1 & 17</p>	<p>Plain and ordinary meaning.</p>
<p>“control channel”</p> <p>’908 Patent: Claim 4</p>	<p>“Multi-Carrier (MC) control subchannel”</p>
<p>“associated with”</p> <p>’908 Patent: Claims 1–2 & 9</p>	<p>Plain and ordinary meaning.</p>
<p>“random access signal”</p> <p>’908 Patent: Claims 1–2, 4, & 6–9</p>	<p>“a direct sequence spread spectrum signal used as a random access signal”</p>
<p>“time-frequency resource unit”</p> <p>’450 Patent: Claims 7 & 11</p>	<p>Plain and ordinary meaning.</p>
<p>“the antenna transmission scheme comprising a transmission diversity scheme or a multiple-input multiple-output (MIMO) scheme”</p> <p>’941 Patent: Claims 8 & 13</p>	<p>“the antenna transmission scheme is capable of comprising, as alternatives, either a MIMO scheme or a transmission diversity scheme other than MIMO. To avoid any doubt, this requires supporting both MIMO and non-MIMO transmission diversity systems.”</p>

<p>“the mobile station-specific transmission parameters indicate ... a corresponding subchannel configuration ... the corresponding subchannel configuration characterized by distributed subcarriers or localized subcarriers in the frequency domain”</p> <p>’941 Patent: Claims 8 & 13</p>	<p>“at a minimum, the mobile station-specific transmission parameters are capable of indicating, as alternatives, both distributed subcarriers and localized subcarriers in the frequency domain as subchannel configurations”</p>
<p>“probing signal”</p> <p>’302 Patent: Claims 23–24, 26, & 28</p>	<p>“a direct sequence spread spectrum signal used as a probing signal”</p>
<p>“the probing signal is configured to occupy a portion of spectrum in the uplink frequency band not designated for transmission of uplink control signals in the system”</p> <p>’302 Patent: Claim 23</p>	<p>Plain and ordinary meaning.</p>
<p>“a receiver configured to receive a request for a probing signal from a base station in the system”</p> <p>’302 Patent: Claim 23</p>	<p>Plain and ordinary meaning.</p>

<p>“the probing signal is configured to overlap, in the time domain, with uplink signals transmitted over an uplink frequency band by other mobile devices in the system”</p> <p>’302 Patent: Claim 23</p>	<p>Plain and ordinary meaning.</p>
<p>“wherein the first plurality of subcarriers and the second plurality of subcarriers are received in at least one of the time slots”</p> <p>’512 Patent: Claims 15 & 23</p>	<p>Plain and ordinary meaning.</p>
<p>“second pilots of a second type”</p> <p>’512 Patent: Claims 15 & 23</p>	<p>“pilots possessing a set of characteristics common to at least two or more cells”</p>